Encyclopedia of

CRISIS MANAGEMENT

EDITORS

K. Bradley Penuel | Matt Statler | Ryan Hagen

Encyclopedia of
CRISIS
MANAGEMENT

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VOLUME ONE

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Introduction

Whenever systems break down unexpectedly, crises can arise. If the initial breakdown is not managed effectively, crises can spread over space and time to threaten not only the effective function but also the existence of the system itself. In this sense, "crisis management" involves planning for, coping with, and recovering from the impacts of unexpected events. As the scope, scale, and complexity of the systems that organize contemporary society increase, crisis management becomes increasingly critical in order to sustain everyday life.

Crisis management is relatively young, having emerged as a field of practice and a field of academic research in the late 1980s following a succession of high-profile and deadly system breakdowns (including the Bhopal gas leak, the nuclear accident in Chernobyl, the explosion of the *Challenger* space shuttle, and the *Exxon Valdez* oil spill). More recently, the crises associated with events as diverse as rogue traders, disease outbreaks, computer malfunctions, and terrorist attacks have led to the establishment of variety of subdisciplines, including business continuity management, disaster recovery, operational risk management, and enterprise risk management. In all of these cases, and in everyday personal situations, crises are "associated with urgent, high-stakes challenges in which the outcomes can vary widely … [depending] on the actions taken by those involved," as stated in the *Encyclopedia of Leadership*.

As of this writing, the most prominent high-stakes challenges currently include the financial and economic crisis that originated in the real estate market in the United States in 2008, continues to have dramatic impacts in the Eurozone, and has recently snared JPMorganChase in scandal; the political crises associated with the Arab Spring, including most recently the tragic civil unrest in Syria; and the looming ecological crisis associated with climate change, which amplified the damage done to coastal cities and towns in the northeastern United States by recent weather events, typified by Hurricane Sandy.

Effective action in response to crisis situations such as these requires art as well as science. Perhaps the most iconic image of the scientific management of crisis is the control center with digital screens along the walls displaying maps, graphs, and charts, with analysts sitting at computer terminals and commanding officers barking out orders. Such settings do exist, and they depend on a variety of networks and embedded technological systems, including everything from the information-gathering and surveillance systems that feed data into the system, to the IT infrastructures that provide a platform for those systems, to the dashboard-style decision support systems that enable leaders to make individual and collective decisions.

In addition to these concepts and resources, creativity and imagination are required in order to deal with unexpected events. Within large businesses, the military, and civil defense organizations, it has become standard practice to include artists, writers, and other creative professionals in scenario planning and war-gaming exercises for the purely tactical reason that they are able to view systems holistically, imagine alternative causal chains, and thereby identify previously unseen sources of vulnerability as well as resilience.

In order to describe and understand why some systems—and indeed, some people—appear more resilient to unexpected events than others, scholars draw on a range of academic disciplines. Computer scientists are developing ever more robust network architecture and backup systems. Natural scientists are working to better understand Earth systems to mitigate natural hazards. Social scientists are developing new ways to model risk and to understand how and why social systems break down in ways that lead to crises, as well as how to avoid these breakdowns or mitigate their consequences. Business management disciplines have formalized new approaches to maintaining operational continuity in the face of disruptions, whether they affect a single enterprise or threaten an entire industry sector, city, or region.

Within this context, the concept of "global risk management" signals a recognition that some potential crises can be addressed only through engagement across the boundaries of individual firms or industrial sectors, and across the divides between governments and the private sector. To this end, in 2006, the World Economic Forum (WEF) began issuing an annual *Global Risk Report*, outlining potential sources of common risk. For example, the WEF's 2007 report highlighted 23 global risks arranged in five categories: economic (e.g., "oil price shock," "excessive indebtedness," etc.), environmental (e.g., climate change or natural disasters), geopolitical (e.g., international terrorism), societal (e.g., pandemics or "liability regimes") and technological (e.g., failure of "critical information infrastructure," and nanotechnology). In 2011, the Organisation for Economic Co-operation and Development (OECD) released its *Future Global Shocks* report, addressing the risk of extreme events that produce continent spanning disruptions. The authors note that, especially in the wake of the 2008 financial crisis, risk management has come to focus on "drivers of vulnerability that tightly weave interconnections between commercial supply chains, technological systems and investment vehicles underlying the global economy," and that "unanticipated events such as natural disasters, failures in key technical systems or malicious attacks could disrupt these complex systems and produce shocks that propagate around the world." Furthermore, the report argues that "knowledge management tools, modeling and data arrays" are making it easier to anticipate and respond to these new cascading risks.

There have been attempts to manage global risk first hand, including efforts through the Global Risk Network (GRN), a project that emerged out of recommendations in the *9/11 Commission Report* and which ultimately found a home through New York University's Center for Catastrophe Preparedness and Response and International Center for Enterprise Preparedness. The GRN now meets regularly, bringing together crisis managers from global companies, nongovernmental organizations, and governments from around the world to build trusted networks and address shared risks.

Ultimately, we see the distinction between natural disasters and social crisis blurring. Within the last decade, there have been at least two cases during which significant natural disasters have cascaded into crises within different social and organizational systems. Hurricane Katrina in 2005 left the city of New Orleans with a local government crippled by a shrunken tax base and substantial infrastructural damage from which the city has yet to fully recover. The storm and its aftermath also triggered crises in the coordination between the Louisiana state government and various U.S. federal agencies. In 2011, the Tohoku earthquake and tsunami that devastated northeast Japan also triggered a nuclear crisis at the stricken Fukushima power station, which led to a crisis of confidence in the leadership of the Japanese government. The radiological accident also wounded the reputation of TEPCO, the company that operated the Fukushima plant, and led to a previously unthinkable shutdown of all of the country's nuclear reactors.

To some extent, the factors that contributed to these crises were well, if not also widely, known. And yet, key actors were surprised by how these systems suffered from crisis, and they were forced to take unplanned actions in hopes of reducing their negative impacts.

The 2008 financial crisis provides an excellent illustration of how the breakdown of one system can precipitate a crisis that spreads over time and throughout other interdependent systems. If a single event could be assigned causal precedence, it would perhaps be at the level of Lehman Brothers' risk management system. Their model—like the models used by many other investment firms at the time—did not adequately hedge the risks associated with mortgage-backed securities, and so when other market participants began to retreat, the firm was in too deep, overly leveraged, and without recourse. At a basic, ethical level, this event could be framed as a breakdown of trust between counterparties. It also represents a crisis of governance and oversight, both in terms of the banks' own boards of directors and in terms of government regulation of the financial markets; a crisis of professionalism, involving mortgage brokers who knowingly duped and defrauded clients; and an identity crisis within business schools, questioning the meaning and purpose of business education.

Given the complex and dynamic nature of the field, we seek in this *Encyclopedia of Crisis Management* to provide an overview of how the practices and the concepts associated with crisis management are currently evolving. In this editorial endeavor, we have presented coverage of 15 categories of articles. These articles include descriptions of agencies within the United Nations and the federal and U.S. state governments, explanations of crises in the engineering and technological sectors, financial and business groups, and natural disasters. We also delve into the crises of politics, international relations, and civil violence, as well as population and demographics. Disaster information databases are covered as well as major nongovernmental organizations, such as religious groups, the United Way, Red Cross/Red Crescent, and the Paul G. Allen Foundation. Risk management standards are included, and also numerous articles on theory, issues, and techniques—presented in civil, corporate, general, public health, and social sciences contexts. In all, some 352 articles explore crisis management in an A-to-Z format, from "Agency Notification and Mobilization" to the "Y2K Bug."

The two volumes should serve practitioners, scholars, and students as a reference, sourcebook, and gateway into the constellation of resources, theories, and practices that make up contemporary crisis management. It should additionally serve to inform journalists about the material conditions and theoretical assumptions that underpin crises, so that as events unfold, the media may more accurately inform and usefully guide the public.

Crisis managers face a paradox—in the words of Swiss playwright Friedrich Dürrenmatt, "The more human beings proceed by plan, the more effectively they may be hit by accident." To some degree, this paradox may be generic to the human condition because anytime people seek to secure their own well-being through mastery of the environment, their intentions may be frustrated by fate and the limits of their knowledge, and because this frustration has emotional as well as material consequences. However, as sociologist Ulrich Beck has pointed out, the paradox has intensified within our contemporary society because "the social production of wealth is systematically accompanied by the social production of risks." In this light, as modern society has created wealth and opportunity for the citizens of the world to a greater extent than ever before, it has become increasingly fragile and susceptible to crisis.

We present this volume with the hope that it may help reduce the economic costs, environmental damages, and human suffering associated with the crises that can arise whenever unexpected events disrupt our organized world.

K. Bradley Penuel
Matt Statler
Ryan Hagen
Editors

A

Agency Notification and Mobilization

Disasters and crises become defining events in a hazard cycle that is marked by four temporal stages: mitigation, preparedness, response, and recovery. As such, primary agencies (e.g., law enforcement, medical, armed forces, city planners, governmental, contractors) strive to "decrease vulnerability to major disaster by taking measures to reduce casualties and exposure to damage and disruption or that provide passive protection during disaster impact." In this way, mitigation strategies aim toward reducing hazard exposures and developing emergency response plans in the event of major disaster or crisis. In order for effective emergency agency response to be effective, therefore, individual social units must be well versed in different forms of proactive response that is sensitive to the community in which the emergency plan is developed. Simply put, Kathleen Tierney maintains that organizational preparedness includes developing emergency response plans; training employees to act proactively and response personnel on what to do in an emergency situation; acquiring needed equipment, supplies, and materials; and conducting drills and exercises. Further, it is imperative that members of emergency response agencies participate in "drills" that enable them to keep their rescue and recovery skills as honed as possible. In the event that a natural or technological disaster occurs, emergency plans and agencies need to be mobilized smoothly and effectively, so as to bring the greatest aid to the largest number of people within the shortest amount of time. With that said, emergency response plans are put into place to mitigate the direct effects of whatever the emergency entails by responding to the immediate needs of the disaster victims.

Because of the possibility of the occurrence of disasters of unprecedented size and destructiveness, it is necessary that each state create an emergency management agency that is charged with authorizing emergency management programs, to give the governor the power to declare a state of emergency, should the need arise, and to coordinate varying offices during a state of emergency to channel appropriate aid to the areas most in need. The state-level emergency management agency is also charged with coordinating volunteer efforts (e.g., Red Cross or humanitarian aid) and shall remain effectively the "go to" arena for entities wishing to assist in the event of disaster and after which time that a state governor has declared a state of emergency.

When emergency agencies (police, fire, emergency medical services, National Guard, armed forces, etc.) are mobilized, the primary emphasis

In order to streamline joint-rescue efforts, an ice rescue instructor from the U.S. Coast Guard Station in Cleveland Harbor, Ohio, provides instructions to Cleveland Fire Department personnel during ice-rescue training on February 3, 2010. Primary agencies strive to reduce their vulnerability to major disasters by enhancing their organizational preparedness, which includes developing emergency response plans, training employees and response personnel, and conducting drills and exercises to sharpen their rescue and recovery skills.

of their actions, according to Tierney, must be to work to "reduce casualties, damage and disruption, and to respond to the immediate needs of disaster victims." Mobilizing response agencies at the local, state, and governmental levels requires an ability to evaluate and neutralize potential threats, sending out necessary warnings to vulnerable populations regarding specific hazards in and around the disaster zone, evacuating populations requiring such, conducting search and rescue operations for victims of disasters, administering medical care, and providing emergency shelter and food until the situation is neutralized. Further, once the immediacy of the crisis has passed, emergency response agencies work to repair, rebuild, and reconstruct (if possible) damaged property, in an attempt to remove populations displaced by crisis and disaster from temporary shelters back to their permanent residences as quickly, and as efficiently as possible.

Returning to the issue of organizational effectiveness, it is clear that local, state, and federal agencies must have a plan in place that governs the way in which individual agencies will coordinate with other entities to ensure the safety of communities at risk. More specifically, it is important for emergency plans to be drawn out so that the degree of emergency/crisis is known and requisite response teams are able to jump into action when presented with specific critical issues and problems. As such, local, state, and federal governments have been charged by the Federal Emergency Management Agency (FEMA), under the U.S. Department of Homeland Security (DHS), with developing specific levels of response, including which teams will respond to specific types of threats, as well as the types of action deemed to be appropriate responses given the threat at hand.

Local, state, and federal emergency planners have identified four levels of response for emergency entities:

Level 1 indicates routine operations. Occurring and forecasted events present little, if any, threat. Events are monitored and managed successfully by the appropriate agency, but additional emergency agencies are not required to respond.

Level 2 indicates a "heightened sense of awareness." Occurring or forecasted events include a potential or present threat, for example, weather or river watch/warning, volcano status changes, multiple wildfires, extended search and rescue, or a law enforcement action. "Events exceed routine, but responsible offices are able to manage with additional support from commonly used sources," according to the definition of the Alaska Division of Homeland Security and Emergency Management. At this level, the Department of Homeland Security and emergency managers may develop search and rescue teams, and may also call upon local emergency planners to "mobilize additional staff, as well as to continue to evaluate" the critical issues at play during the incident. It is important to note, here, that at this level, local, state, and federal emergency managers, acting under the rubric of the Department of Homeland Security, maintain the primary responsibility for managing the integrity of the disaster zone, together with the management with the situation.

Level 3 indicates that an "actual event has occurred or may be imminent," for example: river flooding disrupts public transportation, extended search and rescue requires interagency support, a wild land fire requires evacuation and shelter planning, or a raised Homeland Security threat level. At this level, a local emergency operations center is opened, and elected leadership (state governors, the president of the United States, etc.) may declare a disaster area, so as to release federal funds (administered through FEMA) to assist with the immediacy of displacement following a major emergency. When mobilized at this level, local, state, and federal agencies work together to manage the local crisis. At the mobilization of a Level 3 crisis, the Department of Homeland Security maintains the primary jurisdiction over the crisis but may seek support from other agencies to assist with crisis recovery.

Level 4 is invoked in response to the most extreme life-threatening and/or property-damaging event. Examples include a river flood, sea storm surge, or tsunami that displaces residents and damages structures; or a woodland fire that requires evacuation and sheltering of residents; or occurrence of a damaging earthquake. At this level, the situation is so dire that it cannot be handled exclusively at the local level. Instead, Level 4 crises require significant mobilization of emergency resources from multiple levels of government. During these sorts of extreme emergency events, significant interagency cooperation is a must, and it is achieved through a statewide disaster declaration by the governor. Once again, at this level, primary crisis response is developed, coordinated, and mitigated by the Department of Homeland Security and FEMA. However, in the event that the crisis at hand exceeds what the state and local governments can provide, the governor of the affected state(s) may file a request for a Presidential Disaster Declaration. In so doing, and if the president does declare a specific area as a disaster zone, this action mobilizes federal aid resources and funds to be administered by FEMA.

At the local and state levels, therefore, specific criteria are referenced in such a way as to determine the level of preparedness and potential for crisis in a given region. This analysis includes, but is not limited to, the following issues affecting entities that may find themselves in a disaster zone:

- Actual or forecasted weather events that may cause significant impacts on citizens and their property.
- "Occurring or predicted geologic events that can cause impacts to people, property and transportation systems [Normally these will be volcanic eruptions or increases in seismicity. Earthquakes could change preparedness levels, however that will normally occur after the event]" (state of Alaska definition).
- Wildfire activity throughout the state that impacts other agencies.

- Availability of emergency response and recovery resources in the state.
- Major events occurring in communities that may impact their response capabilities (such as power failures, water and sewer system disruptions, fires).

In sum, agency notification and mobilization remain linked to the type of crisis being experienced, the breadth of resources needed to combat the crisis, and how widespread and far-reaching the critical issues are, vis-à-vis the types of resources available to combat them on a local, state, and/or federal level. Further, one additional component must be considered when evaluating issues of agency notification and mobilization, namely, the role of social media (Facebook, Twitter, Foursquare, Google Plus, etc.) not only in creating fast and easy access to victim/missing persons lists but also in serving as a central point through which volunteer agencies and groups can mobilize their resources and network with others in a quick and easy-to-use platform. Further, social media work to bring communities together quickly and enable an important volunteer platform for the mobilization of resources in addition to those resources that are brought in by local, state, and federal governments. This is especially important when conventional forms of communication break down, as was the case with the two-way radios during the 9/11 terrorist attacks, and during Hurricane Katrina, when volunteers formed the Cajun Army—a group of volunteer boat owners who organized themselves and then braved the waters in the Lower Ninth Ward of New Orleans to rescue people from their rooftops and from the toxic flood waters. As such, while the conventional forms of networking and drawing upon local, state, and federal resources are important, indeed, these efforts are often augmented by the mobilization of the masses, who, if they have resources available to them, often jump into the fray to assist conventional aid workers, often with extremely positive results.

Issues relating to agency notification and mobilization are complex, as communication among and between local, state, and federal agencies can often be mired in red tape. However, recognizing that significant changes have been made since the well-documented debacle immediately following Hurricane Katrina involving the breakdown in getting aid to those who were trapped in the Lower Ninth Ward of New Orleans and in the shelters of last resort (the Superdome and Convention Center), social media sources (Facebook and Twitter) have also taken hold as key social institutions available to mobilize resources in the event of significant disaster or crisis. As the crisis emanating from Hurricane Katrina has made exceptionally clear, not only do local, state, and federal entities play a role in the mobilization of resources (and only do so when notified by official state personnel), but social media also play a pivotal role in bringing aid to victims of crisis and disaster.

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See Also: Crisis Communications; Disaster Declaration; Federal Emergency Management Agency (FEMA); Social Media.

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Air Traffic Control

Because a crisis is considered to be an unexpected event of catastrophic proportions, air traffic control would seem to be an occupation with an extremely high potential for such occurrences. It is true that the potential exists. However, almost every action an air traffic controller takes works toward preventing the development of a crisis situation. In the event of a crisis that exceeds the mental or physical ability of the controller to actually control, such as a catastrophic mechanical failure of an aircraft, it is the controllers' job to protect the remaining aircraft under their control from becoming involved. Because of the nature of the work, air traffic controllers must remain completely focused on their traffic picture. Controllers cannot be distracted simply because the likelihood or potential for an emergency aircraft exists. When it does happen, the controllers must exercise their training, judgment, and experience to manage the situation to the best of their ability.

Training to Prepare

Regardless of the profession, the most effective way to prepare for the management of a crisis is training. To be most effective, the training should be of the highest possible fidelity. The military forces call it "training as you fight." The conditions should be as realistic as possible. This is important in order to elicit the same level of emotions and response that an individual would experience under real-time emergency or crisis conditions. This provides an individual with the optimum conditions to develop the skills required to make the decisions and to take the actions to head off or to mitigate the effects of such an event.

Air traffic controllers begin early with the training process. The vast majority of controllers are graduates of Air Traffic–Collegiate Training Initiative (AT–CTI) schools. These are colleges and universities selected by the Federal Aviation Administration (FAA) to provide training to undergraduate students attending these institutions. The training includes classroom lectures, laboratory simulations, and assessments of their performance.

Upon graduation, the students are hired by the FAA and attend the Air Traffic Control Academy in Oklahoma City, Oklahoma. There the new employees receive additional training by the FAA to prepare them for the type of air traffic control facility to which they will be assigned.

Once they graduate from the academy, the controllers arrive at their facility of assignment and begin the most extensive portion of their training. The actual facility training can take up to several years, depending on the complexity and air traffic volume of the facility. Of course, the busier facilities require a much longer training period before the controller is fully certified to work traffic on his/her own without the assistance of a trainer.

During their training time the controllers are exposed to as many types of emergencies as possible through the use of simulation. This helps in the development of a fine-tuned response that is mostly human reflex. Early response to a crisis often means attempting to make decisions about how to handle the situation while under stress and while lacking key—and often vital—pieces of information. The first thing controllers are trained to do is to acquire enough information to enable the controller to provide the required air traffic control services. Next, the controller complies with the desires of the pilot and assists with the emergency to the maximum extent possible while keeping all other air traffic clear of the situation.

The Crisis

There are certain characteristics that can be associated with any crisis. First, there must be a threat of catastrophic proportions. Second is the element of surprise. Third is a short decision time in which to attempt implementation of a management effort. If one were to question any air traffic controller for an example of such a situation that met all the criteria, without a doubt the unanimous response would be September 11, 2001.

Even though they were not aware of it at the time, air traffic controllers were the first ones to know there was a potential problem developing. Shortly after American Airlines Flight 11 departed Boston, the Air Route Traffic Control Center (ARTCC) watched the aircraft as it proceeded off its route. The aircraft had gone "radio silent" and stopped obeying instructions. Next, the transponder went off. (The transponder provides controllers with vital information, such as the aircraft's altitude and ground speed.) Although this is unusual, this same kind of situation could be expected if an aircraft were experiencing some type of an emergency and attempting to return to the departure airport. Controllers continued to attempt to reestablish communications with the plane and did what their training and experience told them to do—get other traffic out of the way.

When the second, third, and finally the fourth aircraft began to ignore instructions, the entire picture changed. This was not just unusual, this was impossible. By this time, everyone knew that a crisis was unfolding and efforts to manage it had already begun. The military had been alerted and had scrambled fighter jets to intercept the hijacked flights from a base over 150 flying miles from New York.

Managing the Crisis

As the terrorists used the hijacked aircraft to inflict maximum physiological and psychological impact on the American public, the FAA gave a command that had not been heard in the history of air traffic control: Everyone lands, no one takes off.

At the time the FAA made the decision to clear the skies, there were nearly 4,000 planes in the air over the United States. The air traffic controllers responded to the crisis armed with their ability and experience. They buckled down and did their jobs just as they had been trained to do. However, this time the job was of a magnitude never before experienced. Hundreds of thousands of people found themselves in destinations totally unfamiliar to them. Small airports were stretched to their limits as they faced the challenge of attempting to park the grounded flights as they arrived in what seemed to be never-ceasing numbers. And then it was done. Remarkably, the nation's air traffic controllers had landed every plane in the nation's airspace in less than three hours, without a single accident. A crisis management plan had, for the most part, been developed and implemented on the spur of the moment and had been historically successful.

These air traffic controllers did not arrive at their assigned facilities on the morning of September 11 with a crisis management plan on their minds or even considering that a crisis might occur. That is the way it is every day. Controllers sit down and do the job with the assurance that if an emergency or crisis arises, they possess the skills, ability, judgment, and training to manage the situation within the limits of their control.

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See Also: Air Travel; Decision Stream; Hijackings; Routine Emergencies Versus True Crises; Terrorism; Training; Trigger Events.

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Air Travel

Crises in air travel have occurred since humans took to the air. Safety concerns related to unstable weather conditions, structural safety of planes, and inadequate pilot training were associated with early air crashes. With the exception of a few notable accidents, air travel is the safest mode of mass transportation available. However, current threats associated with air travel are most likely a result of terrorism, environmental events, or communicable disease.

Terrorism and Air Travel

Commercial aircraft safety came to a crisis on September 11, 2001, when four commercial aircraft were commandeered in flight. One was deliberately crashed into the Pentagon, the center of U.S. military operations in Arlington, Virginia. Two other airplanes were crashed into the Twin Towers of the World Trade Center in New York City. A fourth airliner failed to accomplish its mission—believed to be a deliberate crash into a high-profile target in Washington, D.C.; instead, the plane was crashed into a field in a rural village in western Pennsylvania. Cell phone communications between passengers and family members during the flight revealed that some of the passengers attempted to wrest control of the plane away from the hijackers and their efforts may have averted a fourth successful terrorist attack on a U.S. population center. None of the passengers or terrorists survived the crash. The four airliners were not hijacked (taken over) for the purpose of demanding money, release of political prisoners, or demands to be flown to safe havens outside the United States. Instead, the takeover of the airplanes was done with the intention of using them and their jet fuel loads as deadly terrorist weapons.

In the aftermath of the 2001 attacks, airline passengers have recognized the risk of losing their lives in suicide bomber attacks. Passengers have responded with increased vigilance and readiness to actively take down terrorists and disturbed individuals who threaten aircraft and passenger safety.

Travelers aboard a December 22, 2001, flight from Paris to Miami reported the smell of smoke, and a struggle ensued between the cabin crew and a male passenger who was later identified as a terrorist. Passengers quickly came to the aid of the cabin crew and restrained the individual with improvised handcuffs and the administration of a sedative. The plane was diverted by U.S. authorities and safely landed.

In a separate incident, on December 25, 2009, a male terrorist aboard a flight to Detroit, Michigan, from Amsterdam, the Netherlands, was observed trying to detonate an explosive device in his underwear. Passengers rapidly responded on hearing firecracker-like sounds, smelling smoke, and seeing flashing lights. The passengers and crew members restrained the would-be bomber, and the aircraft arrived safely without injury or loss of life.

Airline passengers aboard a January 6, 2011, flight from Oslo, Norway, to Istanbul, Turkey, thwarted a hijacking attempt by wrestling the would-be hijacker to the floor of the plane. One passenger secured the use of a fire extinguisher and fired it like a gun, aiming it at the hijacker's face. No serious injuries occurred, and the crew and passengers were safely landed.

With the urging and assistance of flight crew members, passengers forcibly restrained the captain of a March 27, 2012, JetBlue flight between New York City and Las Vegas, Nevada, who displayed severely disturbed behavior by racing up and down the aisle of the plane. The plane landed in Amarillo, Texas, where the disturbed captain was taken into custody. No injuries were reported.

The accounts of passengers taking successful life-saving actions to protect themselves in flight are examples of heightened awareness and behaviors learned from the tragedy of the 2001 terrorist attacks and the subsequent successful outcomes of passenger takedowns of terrorists reported in the media. Moreover, airborne collaborations between flight crews and passengers have resulted in swift actions against terrorists.

Environmental Crises and Air Travel

Sustained volcanic activity in Iceland spewed ash into the atmosphere during May 2010. Decisions on halting flight activities in ash-impacted areas were made by European governments, and 1,000 flights were canceled. The International Air Transport Association (IATA), an aviation industry group, called for action to improve decision making on when and where grounding of planes should be made in the event of future volcanic eruptions; the agency called for improved research to evaluate flight safety conditions in ash-laden atmospheres and reported that the European states had failed to take swift action in the face of the volcanic ash crisis. The IATA called for common policies, such as existing policies for flying in hazardous weather conditions, to be applied to determine safe flight routes when confronted with volcanic ash threats. Unlike in Europe, in the United States the Federal Aviation Administration (FAA) provides detailed information on ash levels and no-fly zones that is made available to the aviation industry.

Communicable Disease Threats to Air Travel

Communicable diseases such as influenzas—including H1N1 (referred to as avian or bird flu), H1N1/09 (commonly called swine flu), and severe acute respiratory syndrome (SARS)—are examples of highly contagious viruses that can be transmitted from animal to animal or from one person to another. Other forms of communicable diseases include cholera, tuberculosis (TB), smallpox, plague, yellow fever, diphtheria, and viral hemorrhagic fever. Public health agencies such as the Centers for Disease Control and Prevention (CDC) in the United States and the internationally based World Health Organization (WHO) are authorized to identify individuals who pose communicable disease threats to the public. In the United States, the CDC, under the auspices of the federal Department of Health and Human Services, may prohibit individuals suspected of having a communicable disease from entering the country. Isolation and, infrequently, quarantine measures may be taken to protect the public from exposure. The confined space and limited air transfer in the pressurized atmospheres of airplane cabins increases the danger of spreading communicable diseases in close quarters, not only to the passengers and crew, but also to the unsuspecting public when communicable disease carriers arrive at their destinations, blend into the general population, and become difficult to track by public health agencies. The International Cooperative Arrangement (ICAO) for the Prevention of Spread of Communicable Disease through Air Travel (CAPSCA) is an international agreement between governments, public health agencies, and the aviation industry to combat the transboundary spread of communicable diseases through air travel and air cargo transport. CAPSCA serves as a communication vehicle for nations to more effectively work together to address communicable disease crises involving air travel. A critical function of CAPSCA is to help countries adhere to WHO International Health Regulations governing communicable disease transmission.

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See Also: Biological Weapons; Centers for Disease Control and Prevention (CDC); Cholera; Ebola Virus; Epidemics; Hijackings; Pandemics; Quarantine; Sabotage; Severe Acute Respiratory Syndrome (SARS); Smallpox; Suicide Bombings; Terrorism; Tuberculosis; Volcanic Eruptions; World Health Organization (WHO), UN.

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All-Hazards

A hazard is a dynamic phenomenon that threatens people and their possessions, assets, and activities with injury, damage, destruction, or curtailment. Broadly, there are four kinds of hazards: natural (e.g., floods, earthquakes), technological (e.g., transportation crashes, toxic spills), social (e.g., riots, crowd crushes), and intentional (e.g., acts of terrorism, hostage taking). The simplest manifestations of hazards are those that involve a single agent (for example, an earthquake) acting upon a simple situation of vulnerability (for instance, houses that may be damaged). However, it is increasingly recognized that hazards can strike in complex ways. For example, a "natech" hazard is a combination of a natural and a technological agent. One of the largest events of this kind was the Tohoku earthquake and tsunami of March 11, 2011, in eastern Japan that led to a major radioactive release from the Fukushima nuclear power plant.

The intersection between hazards can take different forms. A reservoir dam, for example, may be subject to the following risks: flooding (inadequate spillway design), seismic activity (structural damage, dislevelment because of tectonic uplift or subsidence), sudden landslides or avalanches that cause water waves, sedimentation that reduces reservoir capacity, or merely structural failure. This, then, is a multihazard situation in which naturally generated extreme events interact with the dam, an anthropogenic construction. An alternative scenario is one in which there are cascades of hazard impacts. In one instance, an earthquake damaged a factory that contained a tank full of sulfuric acid: the tank ruptured and spilled its contents into the local river. The first consequence was the structural damage, the second was the need for a toxic spill cleanup operation, and the third was an alarm about possible corrosion of bridge abutments and acidification of groundwater supplies.

Complex and Cascading Hazards

In complex and cascading hazard situations, the principal or triggering event is not necessarily the dominant one in terms of the gravity of consequences. For instance, damage to buildings and structures may result directly from dynamic acceleration of the ground during an earthquake. However, in areas where lenses and strata of saturated sand are common surficial geological formation, liquefaction damage may be more serious. Moreover, major earthquakes commonly cause thousands of landslides. In areas with urbanized, unstable slopes, landslide damage may be more serious than the direct results of the shaking. This was the case in the 1976 Guatemala City earthquake, which severely damaged housing on canyon sides that were heavily affected by seismic landslide activity.

All-Hazards Zonation

The concept of the "hazardousness of place" has been vigorously promoted since the 1960s. At that time it was already common to compile detailed maps of single hazards and their probable effects (for example, landslide susceptibility maps). By the 1990s, advances in spatial depiction had greatly facilitated the ability to combine geographical representations of hazards in order to show how different locations are generally at risk. In particular, the overlay facility of a geographic information system (GIS) enables hazard maps to be compared in order to calculate the hazardousness of place.

Microzonation can be defined as the identification of separate areas that have different potentials for specific hazard effects. Because the zones need to be distinguished from one another, they are usually separated by thresholds, for example, in the force of the mapped phenomenon in relation to its ability to cause damage. Microzonation mapping and analysis needs to be conducted at a scale that can be applied to individual buildings or short stretches of road, or at least small groups of structures, so that remedial and protection work can be carried out on the basis of the hazard information.

The simplest form of microzonation is the single-hazard, single-purpose kind. For example,

A Center for Domestic Preparedness (CDP) team carries a simulated victim through the decontamination process during an exercise at their headquarters in Anniston, Alabama, on August 4, 2011. Responding to all-hazards, mass-casualty events is a core principle of CDP training. In the 1990s, the U.S. Federal Emergency Management Agency developed the "all-hazards" emergency plan, a set of operating procedures and directions for action that could be adapted to a wide variety of different threats.

snow avalanche hazard can be mapped in detail for the purposes of determining potential loss of life or damage to buildings. However, many places are threatened by more than one hazard, or they can be subject to complex or cascading hazards. This very significantly complicates microzonation but greatly increases its explanatory power. Moreover, there are different reasons for conducting microzonation surveys, and therefore the fullest development of the technique involves multiple hazards (and hazard interactions) for multiple purposes. This is the approach that most closely depicts the "hazardousness of place." One limitation stems from the range and quality of data: Even a fully microzoned area can depict only known hazards, and specifically, those whose magnitude and frequency can be measured in spatial terms. This may require long periods of observation. Nonetheless, combining microzonation maps with scenarios of hazard impacts can provide a firm basis for planning risk reduction and emergency response measures.

Case Studies in the Lack of All-Hazards Planning

In the past, emergency plans have been written in order to define procedures for responding to single hazards. This has had an unfortunate consequence: if the area in question suffers from a different form of impact, the plan must either be spontaneously adapted to the situation as it evolves or be abandoned. For instance, on September 11, 2001, the District of Columbia had to cope with the effects of the terrorist attack on the Pentagon and ensuing disruption as people tried to leave the city en masse, using a plan that had been developed for managing the possible effects of the so-called millennium bug, the hypothesized malfunction of computer systems on January 1, 2000. This resulted in management that was less than optimal.

In another example, for many years the city of Florence, Italy, had an emergency plan that was written in response to urban flood hazard, because the largest and most devastating disaster that the city ever had cope with in modern times was the flood of November 3–4, 1966. Although relatively minor flooding did occur in the 1990s and 2000s in Florence, the city had to cope with a terrorist bomb attack in 2003, a fatal crash at the local airport in 1998, and major snow disruption in 2010. In none of these cases could a plan to deal with flooding be regarded as an adequate source of direction.

All-Hazards Planning

In the 1990s the U.S. Federal Emergency Management Agency (FEMA) developed the concept of the modern "all-hazards" emergency plan. This could include chapters on specific hazards, normally those of greatest importance in the area covered by the plan, but its core would be a set of standard operating procedures and directions for action that could be adapted to a wide variety of different threats, including those that manifest themselves in complex or cascading ways.

Hazards that are frequent or of high magnitude and that are known to affect a particular area at recurrence intervals of less than half a century should receive specific treatment in an emergency plan. The level of detail with which the plan treats them will be a function of the precision and depth with which they are assessed. The response to those hazards that are unexpected and cannot be predicted or adequately assessed should be governed by standard, generic procedures. Hence the all-hazards plan needs to be adaptable to a range of threats, from those that are very well known and on which there is a considerable amount of information to those that are highly unusual or improbable—but not impossible.

In the United States, FEMA encourages planners to use an all-hazards framework. National management structures are specifically designed to accommodate this. The National Incident Management System (NIMS) provides a means of implementing on-site incident command for all kinds of hazard, crisis, and response. The National Response Framework (NRF) specifies flexible, scalable, and adaptable response structures for managing national emergencies. The underlying aim is to manage emergencies effectively and efficiently, whatever their cause and consequences. Finally, organizations such as the Citizen Corps Council (CCC) have an all-hazards role in providing nongovernmental local response to different threats in conjunction with governmental authorities at various levels. This whole setup is beset by significant obstacles in that some laws, norms, and regulations are not compatible between federal, state, and local levels. Moreover, there are "gray areas" in which it remains to be determined which level of government should take responsibility for certain actions, such as search and rescue. This further complicates a situation that already has many intricacies.

Multidimensional Emergency Management

One of the biggest challenges of modern emergency management is to be able to make effective decisions in environments characterized not merely by large amounts of data but also by a huge breadth of types of information. In advocating advanced knowledge management techniques, Dag Von Lubitz et al. noted the following: "In the ultra complex setting of mega-disasters, decision-makers must process vast amounts of multidisciplinary, often poorly organized, disparate data and information and convert it into relevant and usable knowledge."

The multilayered response to cascading or complex hazard events may require response from as many as 35 different professions and disciplines. Hence, a further challenge is to provide a common language and culture capable of integrating disciplinary perspectives and promoting interoperability. Half the problem of responding to a crisis is not a question of knowing how to do one's own job but one of appreciating and understanding the actions of other responders, especially those in fields different from one's own.

A further challenge is to be able to extrapolate events and to anticipate unusual consequences in order to be prepared to manage them well. In order to do this, the interaction between hazards needs to be studied attentively, as do the ramifications of societal impact. Areas of the latter that are commonly neglected in emergency planning include the care of inmates in prisons during threatening disasters, veterinary emergency response, and cultural heritage planning. Regarding the last of these, the fragility and irreplaceability of many cultural artifacts makes it imperative to adopt an all-hazards approach to planning. One cannot allow the heritage to be fully protected against one hazard but then destroyed by another that was not foreseen. Once again, detailed procedures can be worked out for common and anticipated hazards, while generic ones must be used for unpredictable events.

In synthesis, it has become generally accepted practice to adopt the all-hazards approach when planning for and managing emergency responses. This must involve tackling the full range of known hazards, using scenario modeling to constrain uncertainties to manageable levels. It must involve designing generic procedures to cope with hazards that are too rare or improbable to be foreseen and on which no data from past impacts exist. Finally, it requires careful attention to the interaction between hazards, including cascades of effects, as the consequences of one impact trigger other hazards and other effects. The complexity of such situations requires emergency planners and managers to use modern tools, such as GIS and knowledge management systems.

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See Also: Cascading Crisis; Emergency Management, Principles of; Federal Emergency Management Agency (FEMA); Hazard, Definition of; Nuclear Risk.

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Alternate Site, Corporate

An alternate site refers to a physical location that employees may work from in the event that their primary workplace is damaged or destroyed.

Needs of Different Corporate Groups

Alternate sites need to be considered for specific groups in the corporate environment. One is an identified alternate site for a crisis management team to convene, such as a backup emergency operations center (EOC) or command center. A second is an identified site for specific business units for emergency relocation. Another is a backup site for a company's data center.

A backup EOC or command center should be situated away from the primary location. Considerations for a location should include environmental concerns (i.e., population density, urbanization) and local hazards (flood zones, fault lines, etc.). It should be in an area not likely to be impacted when the primary location might be impacted. Distance should be a consideration but may vary based on need.

Each business unit within a company should have a strategy for where its work can be continued in the event that its office space is inaccessible. In large companies, other company-owned facilities should be considered. Additional office space in proximity to the affected site may be able to host essential employees and assist in continuing essential processes and operations.

In the absence of other company facilities in close proximity, alternate worksites can be arranged through private vendors. Hotels and vacant buildings may be utilized to accommodate personnel and necessary office equipment. Portable structures, such as trailers, should be considered as well. A frequent concern with this approach is vendors overcommitting. If contracting such services, note in the agreement whether the vendor is allowed to contract with more than one company for a given site or facility. The intentions of the vendor are reasonable, as it is not likely that all businesses using their services will need to do so at the same time. Having many clients means they can offer the protection at a more affordable rate. However, in a large-scale incident that affects many businesses, it is likely that these services will be overcommitted.

Alternate sites may also be secured in the form of reciprocal agreements or memorandums of understanding (MOUs) for the utilization of space for the needed connected infrastructure and employee accommodations should the need arise.

Mobile work solutions are strategies that could be used in the event that a physical workplace is unavailable. Telecommuting can allow employees to work from home when given the appropriate technology in advance to do so. Some employees will be able to continue essential work flows if given access to e-mail, software programs, and company networks from their home computers.

A backup site should be considered when a company's business is dependent on a sophisticated technology infrastructure. This focuses on information technology (IT) and other machinery-related systems that drive a company. If possible, alternate sites should be built to offer 24/7 backup protection and automatic migration of data when the primary system becomes disrupted.

Types of Alternate Sites

There are three types of alternate sites: a cold site, a warm site, or a hot site. The differences between the types are determined by the costs and efforts required to implement each.

A cold site is an identified space that does not contain any resources or equipment needed for business operations. Equipment and resources must be installed in such a location after the disruption has occurred and needs have been identified. This requires the most time to set up during a crisis and is common with general business functions. This is traditionally viewed as the most cost-efficient approach. However, the cost of purchasing equipment during a crisis and on short notice may be higher than in normal times. It may also be more difficult to obtain—and in some cases impossible to obtain—under emergency conditions.

A warm site is an identified space that contains partial resources or equipment needed for business operations, such as desks, chairs, telephones, and computers. This requires less time to set up during a crisis than a cold site and may also be useful for many of the general business functions.

A hot site is an identified space that has the resources and equipment to allow for a complete continuation of a business function. Equipment and resources are maintained as if the site was the primary location. Hot sites vary in size and capability based on the need of the business. This requires minimal time to set up and can be justified when downtime of the business function is detrimental to the overall business. This is seen with specialized business functions. A big and often-overlooked advantage of a hot site is its ability to be used every day for training purposes or as extra work space.

Business Continuity Planning

The identification of an alternate site is part of the business continuity planning process and should be done early in the development of the emergency plan. The alternate site should provide for the continuing of key business functions as identified in the Business Impact Analysis (BIA). For the most part, each business unit within a company should be responsible for identifying its own alternate site strategy versus the company as a whole. This way the individual needs and concerns of each business unit will be addressed appropriately in the business continuity plan.

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See Also: Backup Facility; Business Continuity Planning; Business Resumption Planning; Cold Site; Data Recovery; Disaster Recovery; Downtime; Reciprocal Agreement; Warm Site.

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American Society for Industrial Security (ASIS) SPC.1-2009

The ASIS International SPC.1-2009 standard, Organizational Resilience: Security, Preparedness, and Continuity Management Systems—Requirements With Guidance for Use, has been adopted by the U.S. Department of Homeland Security (DHS) Private Sector Preparedness (PS-Prep) program. The PS-Prep program is designed to improve the preparedness of organizations through conformance to established preparedness standards and best practices. ASIS International SPC.1-2009 provides a cost-effective approach to managing risks of disruption by providing a balanced framework for the minimization of both the likelihood and consequences of disruptive events.

ASIS International

The American Society for Industrial Security (ASIS) was founded in 1955 and officially changed its name to ASIS International in 2002. ASIS International is a professional security nonprofit organization with over 37,000 members and 200 local chapters worldwide. ASIS represents the interests of the security management profession in such areas as business, media, government, and public entities. Additionally, ASIS offers professional security educational materials and programs, certifications, workshops, and conferences. Approximately 20,000 security professionals from around the world attend the ASIS Annual Seminar and Exhibits conference.

In the public, private, and nonprofit sectors, security management responsibilities often include risk management, crisis management, business continuity, and preventing or mitigating other organizational threats. In support of these high-level responsibilities, ASIS developed the organizational resilience ASIS SPC.1 American National Standard, which is one of three standards adopted by the PS-Prep program, as discussed below.

Private Sector Preparedness (PS-Prep)

In 2007, the U.S. Congress directed the DHS to establish and implement the voluntary private sector preparedness accreditation and certification program. As a result of this directive, the PS-Prep program is designed to improve the preparedness of organizations through conformance to established preparedness standards and best practices.

PS-Prep enables organizations to implement the necessary steps for instituting and maintaining a comprehensive management system addressing business continuity, organizational resilience, and emergency and disaster management. Additionally, DHS provides recognition for those entities that certify to the adopted preparedness standards.

PS-Prep is a voluntary program, primarily serving as a resource for private and nonprofit entities interested in instituting a comprehensive business continuity management system. Incorporating three industry standards, PS-Prep offers organizations the opportunity to develop and maintain certification to U.S. nationally recognized approaches to resilience and preparedness. A core function of ASIS International is to promote organizational preparedness. ASIS International, in line with PS-Prep program objectives, developed the ASIS International ASIS SPC.1-2009.

The three DHS-adopted PS-Prep standards are (1) ASIS International's Organizational Resilience: Security, Preparedness, and Continuity Management Systems—Requirements With Guidance for Use (also known as ASIS SPC.1—American National Standard and ASIS International SPC.1-2009); (2) the British Standards Institution's BS 25999 (Part 1 and 2); and (3) the National Fire Protection Association's NFPA 1600, Standard on Disaster/Emergency Management and Business Continuity Programs.

ASIS International SPC.1-2009

The ASIS International SPC.1-2009, also known as the ASIS Organizational Resilience Standard, helps an organization design a system to reduce the likelihood and minimize the consequences of disruptive events. The standard provides a framework for organizations to assess the risks of disruptive events (emergencies, crises, disasters); to develop a proactive strategy for prevention, response, and recovery; to establish performance criteria; and to evaluate opportunities for improvement. The standard guides entities to implement an organizational resilience management system based on specific organizational and stakeholder needs. SPC.1-2009 can be used by organizations to facilitate resilience and preparedness as well as to seek certification recognized by PS-Prep. The standard can be integrated with quality, safety, environmental, informational security, risk, and other management systems within an organization. SPC.1-2009 is designed to be flexible and scalable, to adapt to an ever-changing environment.

The standard is applicable to all sizes and types of organizations (private, nonprofit, public, domestic, multinational, etc.), creating a balanced strategy for both likelihood and consequence reduction for incident prevention and management based on the process approach, which emphasizes the importance of the following:

- Understanding the organization's risk, security, preparedness, response, continuity, and recovery requirements
- Establishing a policy and objectives to manage risk
- Implementing and operating controls for managing organization's risk in the context of the organization's mission
- Monitoring and reviewing the performance and effectiveness of the organizational resilience management system
- Continual improvement based on objective measurement

SPC.1-2009 adopts the plan-do-check-act (PDCA) model, which is applied to structure the organizational resilience management system processes as identified in the following:

- *Plan*: Establishes management system policy (includes a policy statement demonstrating management commitment), objectives, processes, and procedures relevant to managing risk and improving security, incident preparedness, response, continuity, and recovery to deliver results in accordance with an organization's overall policies and objectives based on risk assessment and impact analysis.
- *Do*: Addresses implementation and operation of the management system policy, controls, process, and procedures.
- *Check*: Assesses and measures process performance against management system

  policy, objectives, and practical experience and reports results to management for review.
- *Act*: Take corrective and preventive actions, based on the results of the internal management system audit and review, to achieve continual improvement of the management system.

SPC.1-2009 is approved by the American National Standards Institute (ANSI) and based on the International Organization for Standardization (ISO) management system standard model. The standard integrates plans for managing the risks of disruptive events into their enterprise-wide risk management programs, consistent with the ISO 31000, Risk Management, Principles, and Guidelines. Further, SPC.1-2009 leverages existing investment in other ISO management systems to include the following, in order to improve security, preparedness, and continuity performance:

- ISO 9001, Quality Management Systems
- ISO 14001, Environmental Management Systems
- ISO 27001, Information Security Management Systems
- ISO 28000, Specification for Security Management Systems for the Supply Chain

Conclusion

The standard provides a comprehensive management system approach including security, preparedness, response, mitigation, business/operational continuity, and recovery for disruptive incidents facilitating organizational resilience.

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See Also: BS 25999; Business Continuity Management; Business Continuity Planning; Business Impact Analysis; Business Resumption Planning; Contingency Planning; Contingent Coordination; Department of Homeland Security (DHS); Federal Emergency Management Agency (FEMA); National Fire Protection Association (NFPA) 1600, 2007, and 2010; Pre-Crisis Training and Planning; Pre-Impact Planning Process; Preparedness; Prevention; Recovery Time Objective; Resiliency; Response; Risk; Risk Analysis; Scenario Planning; Strategic Plans; Supply Chain; Trigger Events; Vulnerability.

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Arms Control

In the post–World War II era (1947–87), arms control was largely a function of superpower rivalry between the United States and the Soviet Union as the respective nuclear arsenals, delivery vehicles, advanced missiles, bombers, and nuclear attack submarines made nuclear war and mutual assured destruction a real possibility. Until efforts were made by the two nations to reduce their nuclear capabilities, there had been very limited efforts in the United Nations framework for arms reductions among those advanced states with a fairly robust military. The UN Conference on Disarmament was designed to deal with arms control issues affecting developed nations in areas as diverse as land mines, outer space, fissile material, and the development of advanced weaponry.

Arms control generally came to be understood in terms of its primary principles, which included (1) verifiable and parallel reductions in strategic arms, (2) measures to build confidence between states over further arms developments and research, (3) net reductions in certain weapons systems deemed to be "destabilizing" to a region of the world, and (4) commitment to a verifiable treaty that obliges the parties to engage in balanced reductions of nonstrategic systems over a period of time, which often includes provisions for on-site inspection and external review and verification of these reductions. Against this backdrop was the ambiguous yet firm right each sovereign nation retained under the United Nations (UN) charter to defend itself against attack while simultaneously pledging itself to efforts that promote global security while reducing the distribution and growth of global arms.

History of Arms Control

Historically, one of the first such efforts was the 1899 Hague Convention, which tried but failed to limit armaments to a great degree, while other subsequent Hague conferences addressed issues of arbitration and principles and treaties of warfare. For instance, early Hague conventions approved prohibitions on the use of asphyxiating gases and the use of expanding bullets (dumdums) and discharges of projectiles or explosives from balloons. However, reflecting a perennial problem with such treaties where compliance is seldom achieved, none of these agreements was observed during World War I. One significant effort following World War I from 1921 to 1922 was the Washington Conference, which aimed to reach disarmament, arms limitation, and arms control agreements designed to halt the global naval arms race. In 1930, the London Naval Conference tried to formalize earlier agreements; however, Italy and France refused to agree to an extension of the treaty and Japan withdrew in 1935. The 1925 Geneva Protocol, which now has some 130 parties, prohibited the use of asphyxiating and poisonous gases and bacteriological weapons in international conflicts, though it did not apply to internal or civil wars. Ironically, many countries retained the right to use such weapons in a retaliatory strike, and some attempted to limit first-strike prohibitions altogether.

By comparison, the major arms control treaties that obligated the United States and the Soviet Union to balanced nuclear reductions included the following:

- START I (1991): The United States, Russia, and the former Soviet republics agree to limit major nuclear weaponry. The agreement became effective in 1994, to be implemented by December 2001. The major limitations include the following:
    - » 1,600 deployed intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and heavy bombers for each side
    - » 6,000 warheads, of which no more than 4,900 may be on ICBMs and SLBMs
- START II (1993): The United States, Russia, and the former Soviet republics enter into an agreement to further limit nuclear weapons. Basically, the warhead limit was reduced to 3,500, of which no more than 1,750 could be SLBMs. The U.S. Senate ratified this agreement in January 1996, but Russia has made ratification contingent on U.S. acceptance of subsequently negotiated agreements that extended the deadline and that made the Soviet republics parties to the Anti-Ballistic Missile (ABM) Treaty. Ratification was further delayed because of the U.S. intention to withdraw from the ABM Treaty. In May 2002, Russia and the United States negotiated a new treaty that, like START II, reduces nuclear arsenals by about two-thirds. This new treaty must now be ratified by Congress and the Russian Duma.

- ABM Treaty (1972): The United States and the Soviet Union agree not to develop extensive missile defense systems. The United States has maintained that testing and development of ABM systems is within the scope of this agreement. In 2002, the George W. Bush administration formally announced that the United States would be withdrawing from this treaty.

Along with these bilateral treaties there were several multilateral treaties that obligated at least 35 nations, and sometimes many more, to reductions in their respective armaments while also pledging to stem and control the further distribution and proliferation of certain weapons systems. They include the following:

- Chemical Weapons Convention (1993): A multinational agreement to eliminate production and storage of chemical weapons. Only a very few countries have not signed and ratified this agreement. There is an international inspection organization to ensure compliance. The United States has encountered some technological difficulties in destroying some of its stockpile, while Russia has faced economic obstacles in meeting destruction deadlines.
- Conventional Armed Forces in Europe Treaty (1990, modified in 1999): This treaty places legally binding national ceilings on the conventional armed forces of every country party to it and has special restrictions on forces in flank regions. It also contains conflict resolution procedures for member states. The adapted treaty will not enter into force until all 30 signing states ratify the agreement.
- Nuclear Non-Proliferation Treaty (NPT; 1968): The five nuclear weapon states (Russia, United States, United Kingdom, France, and China) agree not to transfer nuclear weapons, other nuclear explosive devices, or their technology to any non–nuclear weapon state. The non–nuclear weapon states agree not to acquire or produce nuclear weapons or nuclear explosive devices. All nations are parties to this agreement except India, Pakistan, Cuba, and Israel.
- Comprehensive Nuclear Test Ban Treaty (1996): This treaty is negotiated under the auspices of the United Nations and prohibits any nuclear explosion whether for weapons or peaceful purposes and includes a system for monitoring adherence to the ban. The treaty does not become effective unless ratified by the five acknowledged nuclear weapon states and the three threshold states of India, Pakistan, and Israel. The U.S. Senate has not ratified this treaty.

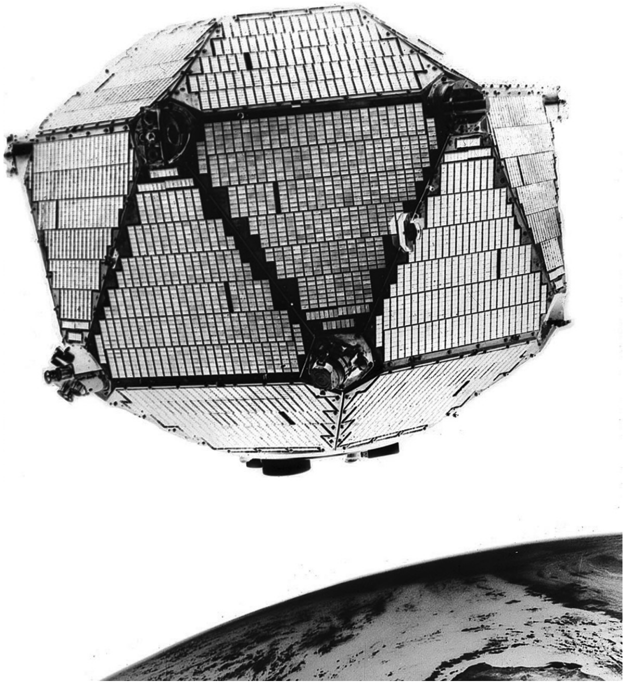
There are other treaties, such as the Land Mines Treaty, to which many states agreed, and the Biological and Toxic Weapons Convention of 1972, which is far from being complete, and yet ongoing negotiations have kept global attention on these subjects as nations wrestle with the existing and emerging array of weapons systems. There is no treaty that circumscribes international missile development, nor is there a treaty that comprehensively addresses advanced weapons systems; however, the desire for most UN nations to bring a variety of weapons systems under some form of treaty coverage and control remains very strong.

Why Arms Control?

Incentives for states to enter into such treaties are the political and presumed economic advantages of reducing arms and promoting confidence through mutual visits and efforts to contain proliferation of arms considered to be destabilizing. Another dimension to this is the irony of sovereign states pursuing weapons programs they believe simply enhance their own defensive options and strengthen their security posture. When India and Pakistan pursued nuclear weaponry, their actions took place outside the NPT and were couched in terms of the need to bolster national security. In the same vein, both North Korea and Iran have embarked on a similar course of action, relying on the ambiguous elements of the NPT to maximize peaceful nuclear research that has the innate potential for conversion to weaponization purposes.

Key issues remain as obstacles to further treaty work on global arms reductions that include the technical and operational challenges of building robust verification systems, finding equitable and enforceable definitions of "noncompliance" with treaty provisions, and agreeing on measures designed to compel states into compliance. Then there is the question of balanced and parallel reductions in existing arms systems, while weapons systems modernization and technologies continue in largely unrestricted domains. There is also the question of proliferation, arms sales, illicit arms trafficking, and the frequent practice of reverse engineering of rival weapons systems by states that used espionage to acquire weapons they need to defeat or replicate.

No easy answers exist for the steady and verifiable reductions of arms considered to be destabilizing, such as advanced fighters, attack submarines, intermediate-range ballistic missiles, and acoustic- and laser-based weapons that convey a distinct tactical or strategic advantage to their owners. The pressure to acquire an advanced weapons systems array that has genuine deterrent power and thereby discourages attacks because of the retaliatory capabilities of possessing states remains one of the most difficult challenges facing those committed sincerely to a more widespread and global move toward wider arms reductions and controls.



These Vela satellites were deployed in support of the Limited Test Ban Treaty of 1963 and carried sensors designed at Los Alamos and Sandia National Laboratories to detect nuclear explosions in the atmosphere and in space.

With advances in weapons technology and the competitive climate for strategic advantage continuing in the absence of total global disarmament, the incentive for many states to acquire robust weapons systems to increase their own security, build deterrence, and demonstrate the power of their armaments is unlikely to cease. Instead, pressures for gradual disarmament must be categorized in terms of two major areas of interest: (1) strategic systems involving nuclear forces, missiles, chemical-biological weapons, advanced laser and robotic platforms, versus (2) lesser weapons systems such as aircraft, submarines, tanks, artillery, and land mines that can be approached in different arms control venues. As a result, avenues for arms control will likely remain inside the UN system for lesser armaments within the annual Conference on Disarmament and those special and unique bilateral and multilateral treaties that address more strategic systems containing destabilizing weapons.

The right of sovereign states under the UN Charter to embark on legitimate self-defense activities is ambiguous enough to persuade any state to pursue a dynamic and strategic capability sufficient to establish a deterrent against externally based attack. This includes missile defense, robust naval and air forces, armies infused with high-technology weapons, and acquisition of strike weapons that possess strategically devastating power. However, as we know, many states have avoided this bottomless pit of progressively lethal weapons systems growth, instead relying on alliances, neutrality, or other effective nonmilitary means to protect their sovereignty.

Future of Arms Control

As new weapons systems emerge and states exhibit advantages arising from these new systems that convey deterrent power and strategic invincibility, the momentum toward further arms control efforts will likely be confined to well-known and controllable weapons systems. Some states will not have the resources or technology to stay abreast of newly developed weapons systems, while others will push ahead despite painful trade-offs elsewhere in their own economies, as North Korea did. Even states that embark on strategic missile defense systems are not immune to pressures to share this protective technology or curb development of such systems inside an arms control treaty. Missile defense, airborne lasers, acoustic wave energy weapons, and other modern systems are often seen as insurmountable national defenses creating fortress-like states that will consistently resist the opportunity to restrict or control these systems through conventional arms control measures or treaties.

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See Also: Biological Weapons; Chemical Weapons; Land Mines; Missiles; Nuclear and Radiological Weapons; Nuclear Proliferation.

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Auditing

Auditing may be defined as the systematic evaluation of a system, function, task, or organization according to established and measurable standards and criteria. Accepted industry practices for business continuity have long included auditing of the areas of safety, security, and emergency preparedness for compliance with requirements both internal and external. Crisis management, as a subset of safety, security, and emergency preparedness, can reap many benefits from a rigorous and regular auditing program to establish the state of preparedness and the effectiveness of procedures, policies, programs, and processes and to provide corrective action where noncompliances or deficiencies are noted so that remedial measures may be put into place prior to failure in implementation.

Purpose of Audits

Auditing is part of preparedness. Clearly, prevention is the highest form of crisis management, and auditing to ensure that preventive measures are in place, as well as responsive measures, is a primary concern in assuring that any organization, jurisdiction, or agency is as well prepared for crisis as possible.

Audits can be performed to meet external requirements for assessment, or they can be an internal process designed to measure an agency's ability to meet its own requirements for preparedness and recovery. Sometimes both external and internal audits are mutually required, with the external audit assessing the efficacy of the internal audit as a measure of quality assurance.

Management Audits

There are several different approaches that may be adopted for the purpose of auditing plans, programs, and procedures for crisis management. Compliance audits measure the implementation of written manuals, procedures, and work instructions, and this is most certainly an effective method of measuring preparedness and response in crisis management. However, management audits make additional analyses of the agency's documents, processes, and activities to focus on results. This is a process that evaluates not just the existence of procedures, programs, and processes but also the effectiveness and suitability of these controls (in this case, to address adverse events that will result in crises that can reasonably be foreseen to occur for the agency, organization, or jurisdiction). It may include reviews and evaluation of methodology and approach. Management audits are compliance audits that additionally employ cause-and-effect analysis. Their evaluation methodology provides the opportunity to identify hazards or failures that occur in chains of events, not simply in one step of the process. For this reason, it is a more effective approach to auditing for critical processes, including crisis management.

The outcome to be considered is the ability to manage adverse events and to recover in an effective and efficient manner. The auditor(s) should ensure that careful review of processes and protocols is performed to ensure that the interrelationships can be adequately explored through the audit process.

Systems Approach

It is well established that effective management of crises is an interdependent process; many agencies, departments, and organizations work together to maximize response and recovery, and in essence, the discrete organizations become a system during crisis management. Auditing of preparedness for crises must take into account and evaluate the interactions between these critical partners. Interdepartmental and interagency communications protocols are critical elements of preparedness and should be well documented and exercised as well as included in the audit process.

Auditing Principles

The basic goals of a crisis management audit program are as follows:

- Assess compliance with all regulatory compliance and internal requirements
- Assess outcomes of programs, processes, and procedures, with emphasis on addressing known areas of difficulty or complex interactions requiring special treatment
- Ensure that all identifiable hazards are documented and addressed in an appropriate manner
- Ensure that appropriate corrective action for any areas of noncompliance or for hazards/adverse outcomes identified in the audit process are developed and implemented appropriately
- Ensure that the audit program is robust, well managed, fully implemented, and documented appropriately

An effective audit program also addresses other issues of concern to the agency, jurisdiction, or organization, including promotion of efficiency in operation, eliminating redundancies and duplication of effort, effectiveness in management and supervision, and the awareness and understanding of crisis management among all partners. Some audit findings may result in recommendations for improvement rather than corrective action for noncompliance.

Areas to be Audited

General areas of inquiry for crisis management include the following:

- Policy and plans: concept of operations, continuity of operations, continuity of government, emergency operations, crisis management, or other plans as required by statute or other requirement
- Planning process: communications, coordination, redundancy, resources, methodology (including post-incident briefing and analysis), and documentation
- Communications: protocols, procedures, unified command, public information, and documentation
- Procedures: preparedness, operations, and recovery
- Training: protocols, procedures, and documentation
- Documentation: as-built drawings, schematics, maps, etc.
- Special operations: hazardous materials, institutional operations (such as schools, hospitals and care facilities, and prisons), utilities, equipment and personnel staging, access and security, information technology, evacuations, shelter operations, weapons of mass destruction (WMDs), pandemics, and other areas as appropriate
- Reporting: statutory, internal, and external (to include after action, grant/reimbursement, etc.)

Depending on the particular threats and vulnerabilities of the organization or function to be addressed, additional areas of inquiry may be appropriate.

Audit Process

An audit cycle begins with notification to the audited department or function. Documentation pertaining to all requirements, standards, and guidelines should be requested and reviewed, and a checklist of all requirements developed. A pre-audit briefing may be held with the area to be audited to introduce the auditor(s) and the key stakeholders, to explain the audit process, to collect documentation, and to address questions and concerns of the participants.

An audit interview is held with the key stakeholders, and the checklist is reviewed to determine compliance with all standards, guidelines, and requirements. Supplemental documentation may be requested to establish compliance. Field verifications to observe preparedness activities and resources may also be appropriate.

Once compliance and noncompliance have been established though the interview and documentation review, the auditor(s) should deliver a preliminary report of these findings to the audited area. A corrective action plan is developed by the audited area to bring any noncompliances into compliance. The auditor(s) may need to provide support to assist the departments in developing the corrective action plan. In addition, any recommended improvements can be addressed in the corrective action plan as well.

Finally, the auditors may also provide assistance in the implementation phase to assist the audited area in developing documentation, implementing programs, and further assessing the corrective actions for suitability and effectiveness. When the cycle is repeated, assessment of previous areas of noncompliance will involve efficacy of corrective actions.

Audit Program

A proper audit program must be well documented and consistently administered. The components of the audit program that must be documented are the following:

- History, purpose, goals, and objectives
- Audit oversight and authority
- Audit philosophy and methodology
- Audit procedures and supporting documents (e.g., checklists, document request lists)
- Auditor qualifications and training
- Audit schedule and cycle (e.g., annual, biennial)
- Audit reporting requirements
- Review and revision cycle for audit program documentation
- Other items as required by the program objectives

There are a number of audit methodologies that may be used as models. The International Organization for Standardization (ISO) publishes a baseline quality management methodology (ISO 9001:2008) as well as an international auditing standard (19011:2011), as do a number of other national and international organizations, including the American Society for Quality, RABQSA, and private businesses specializing in crisis management. The National Fire Protection Association publishes an excellent standard for Emergency Management and Business Continuity (NFPA 1600), which includes a standardized checklist for auditing Continuity of Operations Plans and other emergency management plans, processes, and procedures. It is an excellent resource for crisis management auditing.

Auditors

In order to perform effective audits, auditors must have both training and knowledge in the field to be audited as well as in auditing itself. Training in auditing is available from the organizations listed in the previous paragraph or through continuing education and private emergency management consulting companies.

If possible, audits should be conducted by a team of auditors who have training and knowledge in the areas to be audited. A team approach brings more experience and expertise to the proceedings and thus provides a greater benefit for the organization being audited. The audit team should have a clear leader, who will organize and guide the audit process.

e-Audits

Developments in information technology and assurance have made possible the practice of electronic auditing, which can be defined as an audit in which electronic means are used to collect audit evidence. Methods can be developed for constant real-time monitoring of electronic information and processes related to crisis management and emergency preparedness, and systems can provide notifications when anomalies occur.

There are clear benefits to using e-audits, including increased efficiency, reduction of audit errors, and introduction of real-time monitoring to enhance audit methodology.

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See Also: National Fire Protection Association (NFPA) 1600, 2007, and 2010; Preparedness.

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Avalanches and Landslides

In the El Niño storms of early 1998, the U.S. Geological Survey (USGS) documented approximately $150 million in losses from 300 landslides that occurred in the California area. The 2006 landslide in the Philippines caused about 200 deaths, and about 1,000 people disappeared in the debris. Similar disasters also affect developed countries such as Japan, where approximately 3,000 people have been killed by landslides over the last century. Most landslides have occurred in Asia; however, the costly landslide damages have occurred in Europe (Table 1). Landslides and avalanches are the most destructive disasters in developing countries, particularly those with high population growth, intensive land use and deforestation, and construction and mining activities. Central America, northwestern South America, the Caucasus region, the Himalayan belt, Taiwan, the Philippines, Indonesia, Italy, and Japan are among the landslide hazard hot spots.

Mass Wasting Hazards

Landslides are external geologic processes called "mass wasting." Major causes of mass wasting are the downslope movement of rock under the force of gravity, slope angle, weakness in the structure and composition of rock (weathering), storms or heavy rain for periods of time, snow melting, human activities on slope, erosion of slope toe, deforestation loading or dredging, construction of roads, and mining.

If the mass moves along a curved surface of rupture, the movement is called slump. Usually, slumped material does not travel fast nor very far. If the material involved in rapid downslope movement is a large amount of water-saturated flow, the event has a disastrous effect on people and property. During the extremely fast mass movement, called an avalanche, rock debris along with ice and snow can move downslope at speeds of 200 kilometers (125 miles) per hour, causing a destructive event. Rock slides occur when blocks of bedrock break loose and slide downslope. Such events are among the fastest and most destructive mass movements. Rock slides tend to be most active during the spring, when heavy rains and melting snow are greatest.

Earthquakes also often trigger rockslides. The 1811 earthquake at New Madrid in Missouri caused landslides in the area of more than 13,000 square kilometers (5,000 square miles) along the Mississippi River valley. In terms of property damage, the most devastating effects of the 1964 Alaska earthquake were landslides in Anchorage, some 130 kilometers (80 miles) from the center of the quake. The earthquake triggered landslides of various types and dimensions, causing extensive damage to settlements, farmlands, and infrastructures. In addition to killing people outright, they can also have an extremely serious impact in terms of hampering rescue operations. Landslide activity can cause damage to communication and power networks, and the increased amount of sediment production and movement can also cause many problems.

Mudflow is a rapid type of mass movement that is most characteristic of canyons in semiarid mountainous regions that usually have little or no vegetation and involves a water-saturated debris flow during a large, heavy rain. The rapidly moving dense mudflow can push and carry large boulders, trees, and even houses long distances. The hot materials from the volcano cause rapid melting of great amounts of snow. Such saturated debris flow was also triggered by the volcanic activity of Mount St. Helens in 1980. “Earth flows” occur in humid areas as a result of excessive rainfall. Earth flows are quite viscous. They generally flow more slowly for a short distance downslope, unlike mudflows.

“Creep” is a type of mass movement that involves the gradual downhill movement of soil and may be initiated if the ground becomes saturated with water. Although the movement is slow, its effects are easily recognized. Creep causes fences and poles to tilt, and tree trunks are often bent with the movement.

The steep, narrow continental margins are also highly affected by slope failure processes. Downslope movements of dense mass movement eroding and transporting materials with high speed along the continental slope and rise are perhaps triggered by earthquake activity. In 1929, off the coast of Newfoundland, seismic activity had caused multiple breaks and the breakage of 13 transatlantic telephone and telegraph cables. The avalanche of sediment raced downslope with a speed approaching 80 kilometers (50 miles) per hour on the steep slopes, snapping the cables in its path.

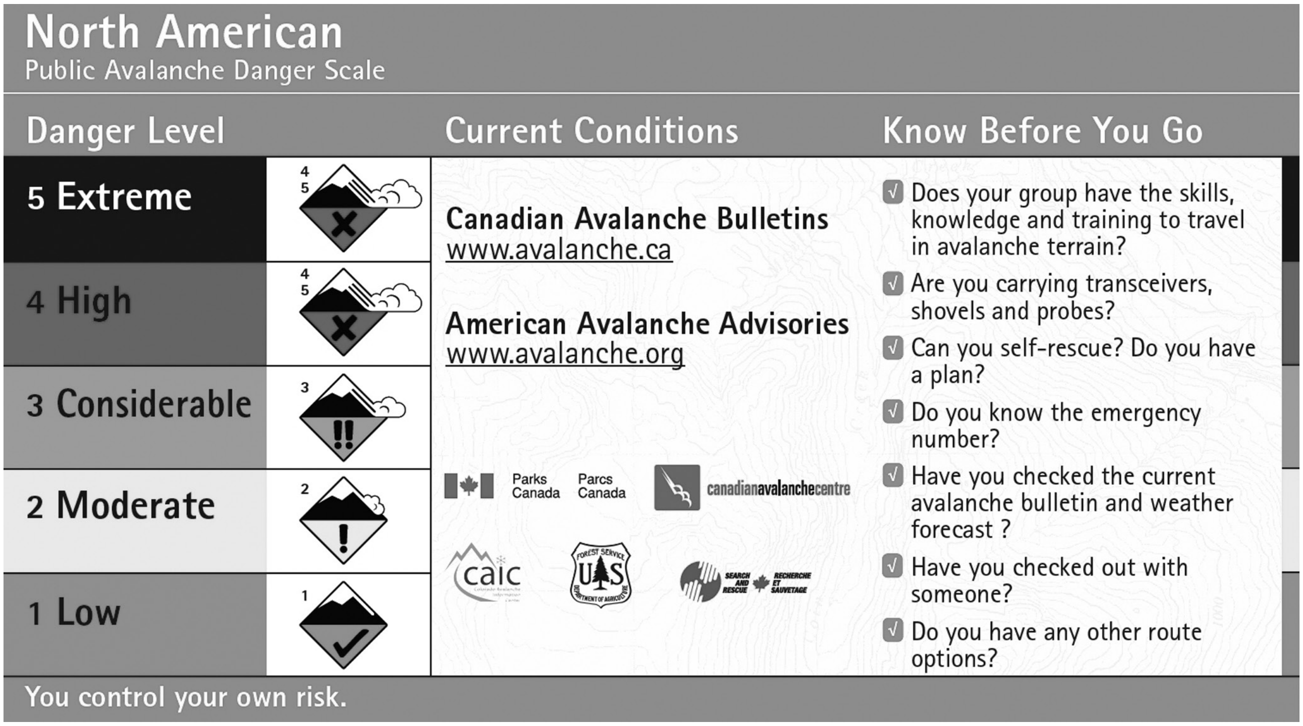
Submarine slides are common and very efficient mechanisms of sediment transfer from the shelf and upper slope to deep-sea basins. They can occur on very gentle slopes, and they have the potential for triggering a tsunami. For instance, steep submarine scarps (15 degrees) of the Marmara Sea, marked with deep basins bounding with continuous sediment transportation via submarine canyons, carry a high risk associated with a large-scale slope failure to generate tsunamis and severe damage along the coastal area of Istanbul.

The tsunami generated by the earthquake-triggered Grand Banks slide in 1929 killed 27 people in Newfoundland. The 15-meter-high tsunami that killed more than 2,000 people in Papua New Guinea in 1998 was also a result of an earthquake-triggered huge submarine slide. The enormity of the Storegga slide, which took place 8,200 years ago, makes it one of the largest submarine slides along the coasts of Norway, Scotland, and the Faeroe Islands. Large submarine slides may again generate tsunamis with the potential for severe damage along coastlines, where oil production from offshore fields is ongoing in the Norwegian margin, Gulf of Mexico, offshore Brazil, the Caspian Sea, and west Africa. Another example is the land failure along the shelf edge at the Nice airport in 1976. Nuclear power plants are often located

Table 1 Landslide damages between 1903 and 2006

	Number of events	Killed	Homeless	Affected	Total affected	Damage, $ (000s)
Africa	23	745	7,936	11,748	19,740	
Americas	144	20,651	186,752	4,480,037	4,671,598	1,226,927
Asia	244	17,554	3,784,351	2,389,151	6,177,032	1,477,893
Europe	80	17,349	8,810	41,281	50,822	2,157,389
Oceania	16	541	8,000	2,963	11,015	2,466

Source: EM-DAT.



North American
Public Avalanche Danger Scale

Danger Level	Current Conditions	Know Before You Go
5 Extreme	**Canadian Avalanche Bulletins** www.avalanche.ca	☑ Does your group have the skills, knowledge and training to travel in avalanche terrain?
4 High	**American Avalanche Advisories** www.avalanche.org	☑ Are you carrying transceivers, shovels and probes?
3 Considerable		☑ Can you self-rescue? Do you have a plan?
2 Moderate		☑ Do you know the emergency number?
1 Low		☑ Have you checked the current avalanche bulletin and weather forecast ?
		☑ Have you checked out with someone?
		☑ Do you have any other route options?

You control your own risk.

Figure 1 North American public avalanche hazard scale
Source: Canadian Avalanche Association.

in such coastal areas. Depending on the volume of deposits, submarine landslides can generate tsunami waves that can affect an entire basin.

Hazard Mapping and Monitoring

Movements such as rockslides and "rock avalanches" are the most catastrophic events of mass wasting. Since these events kill thousands, there is a need for intensive sustainable mitigation measurements, so that, through more effective and timely warnings, monitoring, forecasting, and better risk reduction, lives can be saved.

The Disaster Relief Act of 1974 delegates to the USGS the responsibility to map both flow source areas and existing landslides and to issue disaster warnings for landslides and other geologic catastrophes within the scope of this Local Hazard Mitigation Plan. The USGS has traditionally focused its landslide hazards research in specific geographic areas, such as the Pacific Northwest or southern California. The USGS and its partner, the National Weather Service, developed debris flow warning systems. The USGS has committed to assess the potential for hazard, to identify infrastructure that may be at risk, and to measure real-time precipitations aided by radar data. Warnings are broadcasts through the Advanced Weather Interactive Processing System (AWIPS) to local emergency managers and the media.

Landslides do not only kill people; they can also have an extremely serious impact in terms of hampering rescue operations and the delivery of assistance and can cause long-term damage to communication and power networks. The increased amount of sediment production and movement can also cause many structural and nonstructural problems.

It is also common that landslides do not occur as one singular event but may be induced by earthquakes and volcanic eruptions. Furthermore, landslides can also trigger other disasters such as floods, debris floods, and tsunamis. Therefore, mitigation of other disasters related to landslides should also be integrated into the local/national slope master plan.

The key factors in a comprehensive and integrated disaster management system are hazard and vulnerability identification, risk assessment, and risk mitigation. Generation of "landslide maps" is a core component of risk reduction initiatives and of great significance for assessing the landslide risk in terms of pointing out past and current landslide occurrences, identifying expected damage or losses by landslides, estimating landslide frequency, and risk reduction programs. The USGS produces basic types of landslide maps in California: landslide inventory maps, landslide hazard maps, landslide risk maps, and landslide zone maps.

The national slope master plan should provide crisis management using risk assessment, risk management, and risk communication (Figure 1), with the appropriate standard operating, early warning, evacuation, and rapid (post-disaster) information supply, and needs assessment procedures to support relief and efforts at building back better at the response stage.

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See Also: Earthquakes; Floods; Risk Analysis; Tsunamis; U.S. Geological Survey (USGS); Volcanic Eruptions.

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B

Backup Facility

A backup facility is used like a backup generator when power is lost; it is something to turn to when the primary source is no longer available or accessible. A backup facility is also known as an alternate facility, alternate workspace/place, or emergency operations center (EOC). It is a location that a corporation turns to when access to its primary site fails to provide critical systems and services and is no longer accessible or available. It is activated only when a major crisis or disaster prevents the business from continuing normal operations. A backup site is key to a crisis management team (CMT) if it intends to restore and recover systems and services. The backup facility can be used by technology teams or end users, or as a space for the CMT, as a command center. It can also be any combination of these.

It is used to reestablish core or critical systems and services so that the impact to clients, customers, vendors, and suppliers is minimized and allows the corporation to get back to operations faster than if no alternate (backup) site were available. For crisis management teams, a backup facility provides the ability for other team members to perform their restoration and recovery efforts in the absence of the primary facility. If the primary site becomes unavailable, then there is another facility where workers can go: a contingency site.

There are three kinds of backup sites that can be utilized by a team: a cold site, a warm site, and a hot site.

Cold site: Simply put, this is an empty shell; it cannot be used for anything until resources are acquired and set up (both information technology (IT) and end user items). There is no data here, no IT, no resources of any sort. It is an empty space where organizations can go and begin to populate and set it up for operations when the need arises. To use an analogy, a cold site is like an empty glass compared to a full glass of water.

Warm site: This site may have some physical equipment available, with some wiring in place. It could be limited in space for end user use, but there is a wait required while additional equipment is loaded and configured before it can be utilized. One of the main components that differentiate a warm site from a hot site is that data are not available at a warm site. The warm site must wait for data to be restored and, possibly, user workstations to be connected to a network before any activities can commence. A warm site is like a half-full glass of water compared to a full glass.

Hot site: A hot site is identical to a primary site; it is ready to continue operations almost immediately and often is set up to "fail over" without any human intervention. It contains equipment that has a duplicate set of data—copied at very regular intervals—and systems (i.e., networks, servers, etc.) preconfigured to allow operations to continue. This site can house everything from technology systems to end user desktops and desks. A hot site is like a full glass of water beside another full glass of water.

All three of these backup site options can be broken down into two categories: internal sites and external sites.

Internal: An internal backup site is under the direct management control of the corporation and can be used by the corporation for any purpose.

External: An external backup facility is not under the direct management control of the corporation. Most notably, this is a facility operated by a third-party vendor who has a contract signed by a corporate executive (or even members of the CMT) to provide cold, warm, or hot site services.

The decision to use a backup site comes from the crisis management team at the time of disaster—depending upon the impact—or after a triage discussion (aka an impact assessment) has been performed. If the decision is made to move operations to a backup facility, the CMT then ensures that appropriate communications are disseminated, including vendor, media, the general community/public, supplier, and employee notifications.

A backup facility, either cold, warm, or hot version, is necessary if a corporation or a community leader is to reestablish operations; without any alternate site available, it is nearly impossible to become operational after a disaster.

For instance, if a hot or warm backup facility is available to a corporation or community leadership when a disaster or crisis strikes, it is able to put into action restoration and recovery efforts that will enable critical services to become available sooner than if a site did not exist. If only a cold site exists, it will take longer for services to become available, as teams will be “starting from scratch.” It also means that the CMT will be busy making initial decisions on what to restore first and foremost, but these types of decisions have already been made when a warm or hot site is first established.

The decision as to which kind of backup facility is required is determined when internal impact assessments are completed; the resulting findings can have a positive or negative impact on the CMT. Not having a site to fall back to can mean that an organization can take too long to restore services, which may make partners—and the community—angry waiting for services to be restored. A backup facility that already has some functionality available to the CMT can enable it to be operational sooner, which can only benefit those impacted by the disaster or crisis and in need of core critical services.

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See Also: Disaster Recovery: Emergency Operations Center; Mobile Recovery Site; Recovery.

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Backup Media

The purpose of backup media is to store information for future restoration and use, much like a spare tire is a backup for a tire gone flat. Backup media can take many forms, but the form used needs to be suitable for the restoration process and the restoration environment. Backup media are important to the crisis management process in that having a way to restore the information that existed before the crisis can help the response to and recovery from the crisis.

First Steps

The first step in selecting backup media is to find backup media that can be used by existing equipment to perform the backup and also the restore. The media should be readily available on the open market and not prohibitively costly to use. Media can be reusable, but if they are reused, they must only be reused per the manufacturer's reuse specifications and they should be restored periodically to be sure they areworking properly.

Most equipment capable of using information comes equipped with devices for "reading" new information into the equipment, and sometimes those devices can also be used to "write" existing information out to the same type of media that they are read from. Of course, sometimes the devices are "read only," which means they can only read and cannot write.

Using personal computers (PCs) as an example, they usually come equipped with several ways to read information using different portals on the PC. Some devices on a typical PC include a compact disc (CD) and a digital video disc (DVD). These have drawers that open to accept plastic reflective discs that spin around to be read, much like a record player or an old Victrola. Some CD and DVD devices can also write to blank discs. Unless the disc is rewritable, it cannot be written to a second time. Another device is called a memory stick that plugs into a portal on the PC called a universal serial bus (USB). These memory sticks have no moving parts and are usually small, sometimes called "thumb drives" because of their similarity to the size of a person's thumb.

Media Types and Storage

The two different types of media, CDs and memory sticks, represent two major ways of storing information. CDs and DVDs store information optically, which means the information is read and written using lasers in the CD/DVD drive. The memory stick stores information magnetically or electronically. Each has its advantages and disadvantages. A CD is damaged by heat and ultraviolet light or anything that would deform the plastic disc or inhibit light from passing through its protective plastic outer layer. Memory sticks can be damaged by a strong electrical charge like a power surge or a strong magnetic field or multiple passes through high power X-rays in airport luggage screeners. Both media can survive water, but the electronic media should be unplugged prior to being exposed to water or they could short-circuit. Electronic media need to be dried out over a longer period of time, while optical media can simply be cleaned and used.

In 2009, the National Oceanic and Atmospheric Administration (NOAA) completed implementation of its nine-year, $180 million contract by installing the newest generation of IBM supercomputers (Stratus) and backups (Cirrus). The system and backup will allow the NOAA to run more complex models to extend watch and warning lead times for severe weather. Housed at separate locations, the perfectly symmetrical pairing allow Cirrus to take over in a matter of minutes in the event that Stratus fails.

The environment where the media will be used helps determine the type of media to use. If the media will be exposed to heat and scratching, then magnetic media should be used. If the media are exposed to magnetic fields and potential power surges or frequent X-rays, then optical media should be used. In some cases it may be a good idea to use both media. No matter which media are used, it is always a good idea to back up information periodically and keep at least one of those backups in a separate location from the others, often called an off-site location. For PCs, this off site can be a safety deposit box or a lockbox at a distant site. For business media, any vendor specializing in off-site storage can be contracted with to protect the media. It won't do much good to have backups if they are destroyed with the original information. The following are several different ways to back up and store media:

Internet backup: Another way to provide protection for data is to use an Internet backup service and back up information far away on media protected by the service provider. It does not really matter which media the vendor uses because the information is stored far away from whatever might destroy the original information. A new PC connected to the Internet can be used to restore the lost information.

Read-only media: If computer viruses are of concern, then read-only media should be used. Optical media can allow a backup to be written once but not allow anything else to write over the information or to erase the information. Some electronic storage can be locked so that nothing can write to it until it is unlocked.

Noncomputer media: Backup media do not have to be computer based. Papers can be backed up by making copies and storing them off-site in a safety deposit box; or businesses, there are also off-site paper storage vendors who provide climate-controlled, secure warehouses. Papers can also be scanned as images or pictures and stored electronically. Imaged papers do take up considerably more storage space than just the information on the paper, so consideration should be given to cost per page. An older form of storing papers and images is called Microfiche; it is essentially the mass scanning and storage of small pictures of the documents that can be viewed with a special Microfiche reader that magnifies the images.

Magnetic tape: There is a more business-oriented medium called magnetic tape that uses strips of tape with a film that can be magnetized to hold information. These tapes are subject to the same considerations as other magnetic media but in addition, rough handling can damage the mechanism holding the tape and can even crinkle the tape itself. Another device is an external hard disk drive that is much like the hard drive on a PC, but it is encased and plugs into a computer, usually via the USB plug.

Media Attrition

As time passes, media can become outdated and may not be readable by newer media readers. As time progresses and new backup media are developed, serious consideration should be given to converting existing backups to the newer media, as well as to using the new media for current backups. Nothing could be worse than going to get important information from older backups and finding that there is no longer the capability to read the older format or the older media. The retention of older backups and when they should be converted to newer technology or destroyed always needs to be considered.

Conclusion

There are many forms of backup media that are either optical or magnetic. The possible threats to which media might be exposed should determine which medium are used, or if different types of media should be used. Periodic backup on the media of choice is required to ensure several versions of information just in case one medium is destroyed or cannot be read properly. Older media backups need to monitored so that they can be destroyed or converted as newer media replace older media. Some media backups should be stored off-site to protect them from harm. Planning for the proper backup media can help crisis management speed recovery and get the organization back into operation.

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See Also: Backup Facility; Backup Strategy; Business Continuity Planning Life Cycle; Critical Business Functions; Data Recovery; Dedicated Site.

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Backup Strategy

The purpose of a backup strategy is to create and maintain the ability to recover data that are required to perform one or more necessary functions. Prior to designing a backup strategy, the functions must be prioritized, the required data identified, and the recovery objectives defined. After these data requirements and recovery objectives are defined, a backup strategy can be determined that will meet the recovery objectives. After the backup strategy has been approved and implemented, the processes are tested regularly to ensure they will work properly when needed. Crisis management processes invoke the recovery processes that use the backup strategy.

Business Impact Analysis

Necessary functions are identified using a business impact analysis (BIA). The BIA lists the functions performed and prioritizes them in order of most important to least important. Along with the BIA are financials that state the various costs of all functions not working. Quantifying how much revenue will be lost or how much cost will be incurred while waiting for the data to be recovered helps determine how much to spend on the data recovery processes. Typically, the higher priority a function has, the more its absence will reduce revenue. Conversely, functions with a low priority typically do not garner much revenue or cost much to be without for extended periods of time. Of course, when this information is presented, it is up to the highest-level decision makers to conclude how much they are willing to spend on data recovery to mitigate the identified losses. With an approved spending threshold, the data recovery processes can be determined. At times, the data cannot be recovered within the approved spending threshold. If that happens, the decision makers must decide whether they want a longer recovery time objective (RTO) and recovery point objective (RPO) to avoid the cost of data recovery or to provide additional spending to accomplish proper data recovery. Care should be taken when a function is deemed unnecessary, as most businesses do not spend on unnecessary functions; they will expect that function to eventually be recovered.

Recovery Objectives

Recovery objectives include the recovery time objective (RTO) and the recovery point objective (RPO). The RTO is the length of time a function can operate without the data, and the RPO is how old the data should be when they are recovered. Another determination is the RTO for each function; usually, the more important the function, the shorter the RTO. Then the RPO is determined by understanding the maximum age of the data that must be recovered. Functions may not continue if they must start again with recovered data that are too old. The RPO also helps determine the backup and restoration processes that must be used. Typically, the shorter the RTO and the RPO, the more expensive data recovery will be. This is why the financials discovered in the BIA are important: to provide a cost-to-loss comparison to solidify the spending threshold. With the entire set of requirements and objectives from the BIA and the spending threshold, the backup strategy can be designed. Again, longer RTOs and RPOs allow less expensive backup strategies, while shorter RTOs and RPOs require more expensive backup strategies.

Designing a Backup Strategy: Backup Types

The backup strategy must have the proper environment meeting the spending threshold and the

RTOs and RPOs. There are many aspects of the backup environment that should be understood if someone fluent in technology will not be used to assist in the design.

Data typically are stored in data records that contain pieces of information such as name and address. These data records are stored in data files that represent the current state of all the data they contain. The process is based at the record level. A record is read into a temporary area, that record is changed, and that temporary record then replaces the record in the file. Databases are another way to store data. Typically a database works on parts of records called fields, making it faster because only the field is changed, not the entire record.

Traditionally, there are two main backup types: a full backup that copies everything and can be used to recover everything, and incremental backups that are used between full backups to capture changed files. Full backups tend to take much longer to perform than incremental backups, but incremental backups have only changed data from the last full backup, and each incremental backup must be recovered over the previous full backup to bring the data up to the latest incremental backup. This can lengthen recovery times because the full backup and then all the incremental backups need to be recovered rather than just the latest full backup. In addition, if one incremental backup is damaged, all the subsequent incremental backups cannot be used.

Another type of backup is an intermediate backup. Intermediate backups are usually temporary backups to protect data during updates. For example, at the beginning of the day a temporary backup is made, the daily work is completed, and, once the daily work is verified as being accurate, the last intermediate backup is recycled. This allows any mistakes or intentional malicious manipulation of data to be eliminated by taking the correct information from the intermediate backup.

Databases provide similar backups. A change is made to a field and that change is stored in a log that shows the original data and what those data were changed to. This can be very powerful because the logs can be used to select specific changes to back out if something in the data is wrong. Databases are typically backed up in a similar manner. A database full backup is done and then the log files are backed up to provide a way to use the logs files to roll data changes forward or backward from the last full database backup.

Backup Environment

The backup environment has several different characteristics, networking connectivity to the backup environment (synchronous or asynchronous) and the backup format (character or block) and backup engine (mirroring, replication, etc.).

There are two types of networking for backups: one is called synchronous and the other is asynchronous. Synchronous has a direct connection to the backup environment to maintain constant or synchronized communication that can involve expensive network connections of high capacity. Asynchronous consists of backed-up data that are stored temporarily in an appliance and sent to a like backup-location appliance using a smaller capacity network that is less expensive. Backups take longer to reach their final destination, but they consume less network capacity.

There are two types of backup formats: either block or character. Block formats take data in larger chunks of data that take less time to process but hide the data inside from being used as a way to manage the backups. Character formats allow the use of each character to manage the backups, but they take longer to process.

Following is a discussion of the different types of backup environment engines that can be used to design a backup strategy.

Mirroring sends a character for character mirror image of data synchronously to a backup location that can be either on-site or off-site. Mirroring is typically used to get large amounts of data backed up so that data can be used as if they were a direct copy, or mirror image, of the original data. Of course, the mirror image data are not stored backwards, as if by a reflective mirror.

Replication sends data blocks synchronously, usually off-site, directly to a storage device and can also send data blocks asynchronously, usually off-site, using some replication appliances for intermediate storage of the blocks of data so they can be transmitted off-site using a less expensive network connection.

De-duplication sends only changed data blocks either synchronously or asynchronously off-site using de-duplication appliances to manage the data blocks. Since only changed data blocks are transmitted, the amount of data is greatly reduced, saving transmission costs.

Taking a snapshot of a disk stops processing on the disk and sends a complete copy of the disk synchronously to another storage device, usually at the same location. Rolling or continuous snapshots send data off-site asynchronously.

A long-standing backup strategy is magnetic tape backup. Tape drives are attached to a server specifically designed to perform backups, and all the other servers run a small application called a "client" that allows each server to back up through the backup server. The tapes are changed when they run out of room, and then the full tapes are sent via mail or delivery vendor to an off-site location. The off-site location is usually climate controlled so that humidity does not form water droplets on the tape.

Storage as a Service

There are also vendors who provide Storage as a Service (SaaS), which eliminates the capital expense of equipment and allows purchase of storage based on amount needed. Two of these services are called dispersed storage and cloud storage. A business with several locations can also buy the software and hardware to be its own SaaS provider.

Dispersed storage is a single copy of the data stored across multiple locations in such a way as to allow the reconstruction of one location's data from data at the other locations. This limits the duplication of data without sacrificing the ability to recover lost data. This environment is used by many to protect production data and is really not a traditional backup, because a full duplicate of the data does not exist. Dispersed storage can be used to eliminate disaster backups, but it requires incremental backups to be very strong in case data are corrupted by malicious intent or computer viruses, and it may not be possible to recover from a full backup.

Cloud storage is normal storage provided over the Internet by technology companies that buy hardware and network capacity to provide storage capacity for their customers. This fits into a backup strategy in that data are not located in the primary workplace and so systems are safe from any threat and are protected. Professional data security experts should be consulted before moving to the cloud to ensure the cloud vendor has appropriate processes to meet security requirements for that particular industry. The physical equipment must be protected, the software must have security, the network must be secure, and the vendor must have a process for breaches of security; SAS70 certification is also important.

Other Storage Terms

Some other useful means of data storage include online storage that is always synchronous and used by people in real time. Near-line storage is usually synchronous and used in real-time as slower archival storage. Off-line storage is usually asynchronous and is done on tapes or other media that cannot be accessed immediately. Off-site storage is always asynchronous and takes place on media that can be taken off-site for protection and recovery.

Encryption is an important consideration for a backup strategy. Encryption encodes the data on the backup using a protected key so it cannot be read by anyone else unless they have the key. Without encryption, anyone with the same technology can read backups. Most financial and health care regulations call for the encryption of all backups containing client and patient information. Encryption creates a safe harbor from litigation. The saying is to encrypt everything.

Backup Strategy Using Recovery Objectives

Very short RTOs and RPOs make it necessary to design a high availability (HA) environment where data are used or stored in two or more geographically separate locations at the same time. HA environments allow any single location to be destroyed with little to no loss of data and time. Of course, the people performing the function must also be HA so the entire staff is not disabled with the single location, leaving no one to perform the critical function. HA environments typically use strategies such as SaaS, dispersed storage, and bunkers.

Short RTOs and RPOs provide some more options in design. The HA could still be used if the RTOs and RPOs are too short for other strategies. There are backup processes called replication that back up data from one location to another location called a "hot site," with dedicated equipment ready to be used. When the original location goes down, the replicated data at the hot site can come online in the amount of time it takes to bring the systems up using the replicated data. Recovery would happen in minutes to hours.

Medium RTOs and RPOs allow backup and recovery at more moderate expense. Knowing the amount of data to be recovered helps as well. Many backup and recovery options have estimates of backup and restore data transfer speeds. This makes it possible to estimate the amount of time it will take to back up and also restore the data during recovery. For example, if the data transfer rate is 3 billion characters per minute and the data to restore amounts to 300 billion characters, then the restore will take about 100 minutes. If the data transfer speed meets the RTOs and RPOs, then the design will work well for the recovery. When designing backup strategies for data recovery in the medium RTO and RPO range, a "warm site" could be used. A warm site is an alternate location with equipment in several different states of readiness. In many cases the fastest tape backup and restore devices can be used to recover data, enabling recovery in one or more days.

Longer RTOs and RPOs offer even more choices. A "cold site" is an alternate location with no powered-up equipment and is often an empty shell of air-conditioned raised floor space. The use of a cold site is the least expensive choice, other than doing nothing, but again, it requires RTOs and RPOs of days or longer. The option of preconfigured equipment shipped quickly to the cold site can provide an affordable recovery option. Here again, tape backup and restore is often used and even slower, less expensive devices can be obtained to hold data. Long RTOs and RPOs may allow systems to be re-created from the installation media and either reentering data or starting fresh, entering older data by hand as time permits.

Case Study: Health Care Industry Backup

A company that hosts computer software for health care clients with 24/7 operations had a backup strategy that allowed recovery of critical systems within 24 hours from tapes stored offsite at a warm site.

The health care industry received new government mandates that required more stringent controls on health information and more consistent delivery of patient services like medications. As the clients requested additional software products and more online real-time access to these systems to meet the mandates, there was a shift in the recovery requirements that also changed the backup requirements.

The government health care mandates pushed the health care information onto computer systems from paper and, because the information was no longer on paper, the recovery objectives were shortened to hours to avoid the problem of, for example, not being able to deliver medications because computers were down.

The business continuity life cycle (BCLC) was initiated to address the shortened recovery objectives, and the results changed the backup strategy from tape backup and recovery at a warm site to a warm site with asynchronous data replication. This backup strategy allowed data to be sent to an alternate location with equipment that could be started up and running within a few hours so that clients could provide critical services such as medications while still meeting government-mandated treatment of health care information.

Bunkers

One final option is to avoid losing data and also avoid having the cost of equipment just for backup and recovery. One choice that meets these criteria is known as a bunker. Just as the U.S. military uses bunkers to protect assets, a business can use a bunker to house its existing systems and data. Because the bunker is impervious to all natural hazards and most human-made hazards, there is only the need to purchase equipment used on a daily basis. No extra cost for backup equipment for alternate site recovery is needed: no HA site, no cold site, no warm site. The only drawback is that everyone must access the site through network connections that may go down. But redundant connections and redundant network vendors coming into the bunker can enable a quick switchover to an alternate network vendor.

Backup Media

Some other things to consider are the different forms of backup media. There are two major types of backup media: optical and magnetic (electronic). The possible environmental threats that the backup media would be exposed to should help determine which media are used. Optical media tend to store data on reflective material in a plastic substrate such as compact discs (CDs) and digital video discs (DVDs). These optical media are susceptible to damage from scratches, heat, and ultraviolet rays from the sun over prolonged exposure. Magnetic media such as tapes and external hard disk drives (HDD) are susceptible to electric surges and strong magnetic fields as well as string X-rays that may be found in airport baggage scanners.

Older media backups need to be monitored so that they can be destroyed or converted as newer media replace older media.

Some media backups need to be stored off-site to protect them from harm during disasters. There are many off-site storage vendors who even have climate-controlled storage rooms to prevent condensation from forming within the media containers and damaging the media.

Exercising Backup and Recovery

After the backup strategy has been approved and while it is being implemented, there should be activities to develop periodic testing of the backups to ensure those backups can actually be recovered; this is commonly referred to as disaster recovery testing. Typically, disaster recovery tests are performed several times each year and the results used to enhance the recovery process.

Conclusion

The purpose of a backup strategy is to create and maintain the ability to recover data that are required to perform one or more necessary functions. Prior to designing a backup strategy, the functions must be prioritized, the required data identified, and recovery objectives defined. After these data requirements and recovery objectives are defined, a backup strategy can be determined that will meet the recovery objectives. The strategy should design the backup (and recovery) environment based on the RPOs and RTOs and the cost threshold identified by decision makers, as well as the proper backup media. After the backup strategy has been approved and implemented, the processes are tested regularly to ensure they will work properly when needed. The processes resulting from the backup strategy are invoked from the crisis management process.

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See Also: Backup Facility; Backup Media; Business Continuity Planning Life Cycle; Critical Business Functions; Data Recovery; Dedicated Site.

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Bankruptcy, Corporate

Bankruptcy laws provide part of the legal context in which businesses operate because they specify how a failed business, or a business that cannot meet its financial obligations, will be treated in court. Bankruptcy laws (which may include principles based in common law as well as statutes) provide guidelines for courts to examine and weigh the claims of creditors, value the assets of the business, direct how the assets will be distributed among the creditors, and possibly cancel some of the debts. Bankruptcy laws vary considerably from one country to the next, reflecting the differing attitudes different societies hold toward bankruptcy and related issues such as the relative importance of promoting risk-taking versus prudence.

Bankruptcy laws are essential to the functioning of a modern business environment because they establish rules that set the framework within which loans are offered and accepted and thus promote credit and business growth. Ideally, bankruptcy laws recognize the claims of both the debtors and the creditors and treat everyone fairly. When a business venture goes bad, the bankruptcy laws allow those involved in a failed enterprise to make a new start and see that whatever assets are available for distribution are shared fairly among the creditors. In the context of crisis management, understanding the process of bankruptcy is critically important, as it is a form of regulatory risk. For example, if a company is forced into bankruptcy as part of a crisis, and it is not up to date on how to follow the law, it is in a position to make the situation worse, potentially losing more money to fines, unprotected assets, and the like.

Attitudes toward bankruptcy have changed over time and vary across societies. In ancient Greece, indebted persons and their families were sometimes forced into debt servitude, working with no pay until their debts were paid off. In the Middle Ages, debtors in some countries were maimed, publicly flogged, or imprisoned; these practices were focused on deterring bankruptcy, which was seen as a kind of fraud, rather than on enabling the debtor to discharge the debt. In addition, debt was commonly viewed as the responsibility of an individual, even if it was a business that went bankrupt. However, today the bankruptcy laws in many countries, including the United States, also recognize the value of allowing a bankrupt person or company to make a "fresh start" after a business failure and thus have made the consequences of a bankruptcy less severe for the debtor.

U.S. History of Bankruptcy Law

In colonial America, bankruptcy laws were influenced by English law and provided severe punishments for bankruptcy, up to and including death. To settle debts, all of the assets owned by the debtor could be seized by the court and liquidated, including the tools the debtor used to make a living, thus making it very difficult for a bankrupt person to get back on his feet again; if the debtor tried to conceal assets during the bankruptcy process, he could be executed. American bankruptcy law continued to be heavily influenced by English law into the 19th century, although different states were allowed to have different laws, resulting in some provisions that seem eccentric to modern eyes, such as giving American creditors preference over English creditors, or giving preference to creditors within the state where the bankruptcy was filed, as opposed to creditors from other states.

The federal Bankruptcy Act of 1898 included several major reforms: it contained provisions to restructure debt, it allowed states to decide which of a bankrupt's assets were exempt from distribution, and it provided for equitable distribution of the bankrupt's assets to creditors. This law set the context for bankruptcy in the United States for the next century and made the prospect of filing bankruptcy much more attractive: most bankruptcies in the United States before 1898 were involuntary (initiated by the creditors), but since 1898 most business bankruptcies have been voluntary (initiated by the debtor).

Current U.S. bankruptcy law is based on the Bankruptcy Reform Act of 1978 and is codified in Title 11 of the U.S. Code. Title 11 allows for six types of bankruptcy, and these types of bankruptcy are often referred to by the chapters of the code in which they are described. The most common types of bankruptcy are Chapter 7 (liquidation) and Chapter 11 (reorganization); Chapter 9 refers to municipality bankruptcy, Chapter 12 to bankruptcy for family farmers or family fishermen, Chapter 13 to individual debt adjustment, and Chapter 15 (added in 2005) to bankruptcies involving more than one country.

Current Bankruptcy Law in the United States

Today, bankruptcy in the United States is governed by federal law, and bankruptcy cases can only be filed in federal courts; state courts have no jurisdiction over bankruptcy, although they may differ in matters such as which assets of a bankrupt company or person are exempt from liquidation. There are 90 bankruptcy courts in the United States, with at least one in each state. The most common type of bankruptcy is Chapter 7 bankruptcy, also called liquidation. Under Chapter 7, the court appoints a trustee who takes over the debtor's assets (with certain exemptions for essential property), reduces them to cash, and distributes the cash to the creditors. Companies filing for bankruptcy under Chapter 7 go completely out of business, and usually individuals holding shares of the company's stock lose their entire investment.

SKYLINE DISTRICT
1400
Smith
Bell

The former Enron complex on 1400 Smith Street in Houston, Texas, which Chevron took ownership of and occupied in 2011. On the morning of October 26, 2001, Enron workers arrived to find the surrounding avenues blocked and cordoned off by police because of an overnight terror threat. It was a false alarm, but the real crisis was already in progress inside: as an enormous accounting scandal unraveled, Enron's stock prices quickly collapsed, resulting in fraud convictions, destroyed reputations, and bankruptcy.

Most businesses filing for bankruptcy in the United States do so under Chapter 11, also called reorganization. Chapter 11 allows a business to continue operation under a plan of reorganization approved by the court, while paying creditors over a period of time; in addition, some debts may be discharged (allowed to go unpaid) and some contracts terminated under Chapter 11. To initiate the proceedings, a debtor files a petition including a disclosure statement containing information about the business's liabilities and assets, and a plan of reorganization, including classifying the claims involved and how each will be paid; creditors are allowed to examine this statement, but the court has the final word on whether or not it will be accepted.

When a company files for bankruptcy, there is often not enough money to pay all the claims of all the creditors. Normally, secured creditors, such as banks, have first priority. Unsecured creditors, such as suppliers and bondholders, are the next priority, and stockholders have the weakest claim on the company's assets; if the secured and unsecured creditors do not receive the full value of their claims, the stockholders may receive nothing (their stock becomes worthless). Although a company in Chapter 11 bankruptcy may continue to be traded (although not usually on the New York Stock Exchange or NASDAQ), they are a risky investment because the shares may be canceled as part of the reorganization, and even if they are not, stockholders are a low priority when the company's assets are distributed. When a company emerges from bankruptcy, it may have two types of common stock traded: the old stock that was on the market when the company went into bankruptcy and a new common stock issued as part of the reorganization.

Although corporate bankruptcies are often highly publicized, due to the fame of certain companies and the large amounts of money involved, most bankruptcy filings by the United States are individual, rather than business, bankruptcies. According to data reported by the American Bankruptcy Institute, since 1980, the percentage of bankruptcies in the United States filed

Case Studies: Notable Corporate Bankruptcies

Continental Airlines filed for Chapter 11 bankruptcy reorganization twice, on September 23, 1983, and again on December 3, 1990. Continental had been acquired in 1981 by the Texas Air Corporation, controlled by Frank Lorenzo, and in 1983 was suffering financially due to deregulation (meaning that had to compete with other airlines based on price) and the recession. However, Lorenzo was also involved in struggles with the labor unions representing Continental's workers; he argued that the company would not survive unless they accepted layoffs and reduced wages but was unable to achieve the changes he desired through negotiation.

As part of Chapter 11 reorganization, the company was freed from its obligations under the old labor contracts, and new contracts were drawn up that were substantially less favorable to the workers; due in part to the Continental example, federal law was later changed to make it more difficult for companies to use bankruptcy to cancel labor contracts. The company emerged financially sound from Chapter 11 in 1986. On December 3, 1990, Continental again filed for bankruptcy; factors contributing to the company's financial difficulties included increased fuel prices due to Iraq's invasion of Kuwait on August 2, 1990, and debt incurred by Lorenzo's aggressive policy of expansion. Continental emerged from this second bankruptcy in 1993 and continued to function as a profitable airline.

When the Enron Corporation filed for Chapter 11 bankruptcy reorganization on December 2, 2001, it was the largest bankruptcy to date in U.S. history. Enron began as a natural gas supplier but in the 1980s became more focused on creating markets rather than providing products or services; for instance, Enron made an estimated $1.5 million trading in electricity supplies during a power crisis in California from 1997 to 1998. Between 1998 and 2000, Enron was one of the most profitable corporations in the United States. However, Enron's stock price fell sharply in 2001, and it was later revealed that Enron executives had been selling their stock beginning in 1999 while publicly proclaiming the financial health of the company and using misleading accounting practices to hide its true financial condition. Numerous Enron officials were convicted on charges that included conspiracy and securities fraud, including CEO Kenneth Lay, President Jeffrey Skilling, and Chief Financial Officer Andrew Fastow. The scandal also destroyed the reputation of the accounting firm Arthur Andersen.

The financial services firm Lehman Brothers filed for Chapter 11 bankruptcy on September 15, 2008; the company held over $600 billion in assets, making Lehman's bankruptcy filing the largest in U.S. history. As an investment bank, Lehman was not subject to the same regulations as depository banks and was heavily leveraged with substantial investments in the housing market. Lehman profited during the housing boom of the 2000s but began to incur heavy losses in 2007 due to the subprime mortgage crisis. Despite evidence that the company was not doing well, Lehman's filing for bankruptcy shocked the financial world, and the Dow Jones average dropped over 500 points (a 4.4 percent decline) on the day Lehman filed. The Lehman bankruptcy also focused national attention on the issues of executive pay (e.g., CEO Richard Fuld received $484 million in salary, bonuses, and stock options from 2000 to 2008) that seemed to many excessive, particularly for someone in charge of a company when it went bankrupt.

by businesses peaked in the mid-1980s but has declined since then. In 1980, 13.2 percent of bankruptcy filings were by businesses; in 1984 (the peak year), 18.4 percent; in 1985, 17.3 percent; in 1990, 8.5 percent; in 1995, 5.7 percent; in 2000, 2.8 percent; in 2005, 1.9 percent; and in 2010, 3.5 percent. The number of businesses filing for bankruptcy in the period 1980–2010 peaked in 1987 and has fluctuated up and down during the period. In 1980, 43,694 businesses in the United States filed for bankruptcy; in 1985, 71,277; in 1987 (the peak year), 82,446; in 1990, 64,853; in 1995, 51,959; in 2000, 35,472; in 2005, 39,201; and in 2010, 56,282.

Ethical Issues in Corporate Bankruptcy

It is tempting to interpret bankruptcy on a moral level, with the bankrupt company cast as a reprobate that failed to meet its obligations to the creditor who was good enough to lend it money. This interpretation draws on the common ethical standard that all debts should be paid; bankruptcy laws violate this standard by allowing some debts to be dismissed or deferred. However, bankruptcy laws can be justified as a necessity in a modern economy, and most would argue that they increase the overall wealth of a society by allowing companies to take risks, and to resume functioning after a business failure. Bankruptcy laws also make credit more available to businesses because they assure creditors that debts will be discharged in a fair and orderly process should a business file for bankruptcy. Another argument in favor of regarding bankruptcy as part of the business environment, rather than a question of morality, is that anyone should recognize that every business venture involves risk, and lending money is itself a business and is therefore not a risk-free venture. Anyone in the business of making loans must allow for the fact that it is possible that the loan will not be repaid in full or on time; this is one reason lenders charge differing interest rates to different enterprises and also why they may demand collateral to secure a loan.

Some charge that the Bankruptcy Reform Act of 1978 allowed businesses to develop a new strategy, sometimes referred to as “strategic bankruptcy,” which can be seen as an abuse of the ethical principles that should govern business dealings. A company using this strategy may focus on creating high profits in the short term while incurring debt that it intends to discharge through Chapter 11. Persons ranking high in the corporate hierarchy may receive substantial bonuses based on the company’s short-term performance while concealing the true financial health of the company. In addition, misleading accounting practices may conceal the financial health of the company from the public, which believes the company’s stock is a good investment based on the information available to it. Because they have privileged information, people holding leadership positions in the company can sell their shares of a company’s stock while the price is still high, while ordinary shareholders will still be holding the stock when its value drops sharply (e.g., due to bankruptcy filing or the release of previously withheld information). Companies may also use Chapter 11 bankruptcy to get out of contractual obligations, for instance, contracts with labor unions.

The counterargument to these charges is that the bankruptcy code requires companies to fulfill their obligations as best they can and that the purpose of allowing companies to renegotiate contracts is to allow them to meet all of their obligations as best they can. By definition, an insolvent company cannot meet its obligations, and bankruptcy laws are intended to maximize assets and distribute them fairly in a less than ideal situation. Although it is true that not everyone has access to the same information or quality of legal advice (a fact true in most areas of life, not only bankruptcy proceedings), the law does not recognize these differences but requires that all claims be treated equally. In addition, anyone involved in business transactions, including unions negotiating labor contracts, must be aware that every contract includes the possibility that it will not be honored.

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See Also: Blame, Politics of; Commodity Shortages; Crisis Communications; Critical Business Functions; Debt Crisis; Failover; Fraud; Income Inequality and Labor Unrest; Legal Liability; Organizational Failure; Product Defects and Recalls; Product Tampering; Stock Market Crises; Strikes.

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Biological Engineering Risk

Following the rapid evolution of biotechnology and genomics in the 1990s, with sophisticated efforts to manipulate and engineer recombinant DNA (deoxyribonucleic acid), the onset of synthetic biology (or SynBio) in the 21st century may have been seen as a natural result of prior scientific research. But now SynBio, as it is often called, goes beyond mapping genomes and manipulating genes to the point where scientists and graduate student microbiologists not only are examining how to build life from scratch, and merge or transfer genomic material between different species, but are also experimenting with every conceivable combination of nucleic and amino acids and engineering new life-forms.

This is a new iteration of genetic engineering taking place in commercial settings, on university campuses, in government labs, and within the privacy of creative people's own homes. In the name of scientific advances aimed at bringing the greatest benefits to the greatest number, the vast amount of SynBio work appears to be targeted at lengthening life spans, curing diseases, and helping solve intractable public health problems. All of this burgeoning creativity takes place in the absence of widespread societal debate and regulatory oversight. SynBio entails construction of new biological parts, devices, and systems not normally found in the natural world along with redesign of existing biological systems to perform specific tasks. In some cases, genomic material is being structured and combined with nanoscale technologies, moving life's basic ingredients around at the atomic and molecular levels. In the context of crisis management, these risks, both physical and through public perception, should be recognized.

Future Anticipation and Residual Angst

Researchers engaged in SynBio are convinced that, with enough knowledge, they will be able to write programs controlling genetic components, allowing eventual incremental adjustments to nature itself and, in so doing, guide and influence human evolution. The prospects and possibilities attached to SynBio are breathtakingly impressive and full of promise for the betterment of humankind. No recent scientific achievement has promised so much and yet contains significant ambiguous risks and disturbing implications for deliberate abuse, including criminal and warlike misuse.

But there is profound irony in a scientific endeavor that abundantly signals benefits while downplaying deliberate or inadvertent risks of abuse and misuse. Public perception plays a huge role in the overall societal acceptance and endorsement of SynBio, and it remains unclear whether there will be widespread public support for independent engineered cells becoming their own factory, producing new chemicals or new life-forms. Between tacit approval and universal endorsement by the public is a widely ambiguous zone of calculated indifference.

In a 2009 survey from the Wilson Center Project on Emerging Nanotechnologies, some 22 percent of adults indicate they have heard a lot or some about synthetic biology. But nearly half—48 percent—have heard nothing at all about the technology. Public ignorance of SynBio is an issue that needs to be examined because the governing assumption is that society acknowledges and supports all the myriad scientific programs, schemes, and projects under the banner of SynBio.

The origins of wider public angst are rooted in the concern expressed by some lawmakers, pundits, and press commentaries that the entire SynBio environment globally is essentially a "wild West" free-for-all environment with no ground rules, regulatory oversight, or periodic government scrutiny. It follows that opportunities for criminals, terrorists, and rogue dictators to devise SynBio tools and weapons in the future cannot be ruled out. Worse, any such weapon would likely confer the kind of strategic advantage to its owner that a dozen nuclear weapons provide. Because no cure, prevention, or vaccination against the SynBio designer disease can be effective, the owner has substantial power and strategic leverage.

Nevertheless, the global SynBio community has generally favored self-regulation. Public concerns about excesses in genetic engineering and patenting life-forms provoke the question of whether any metrics, standards, or special procedures can be developed to somehow govern the conduct of SynBio research and thereby foster a global commons of prudent risk management.

What Is the Risk Terrain?

It is natural to expect global commercial competition, the natural competition among sovereign states embroiled in security equivalence measures, and the pure desire among many scientists to garner Nobel fame for their work is sufficient to build a firewall against mischief and criminal behavior. Many sincerely believe this mechanism will provide a transparent avenue for SynBio to regulate itself. To get a better glimpse of the risk terrain attached to SynBio, we should look at one recent U.S. government effort to examine SynBio strengths and weaknesses.

The National Science Advisory Board for Biosecurity (NSABB) established a synthetic genomics working group in November 2005, and that group raised some significant concerns attached to SynBio that may pertain to select agents (SAs), which the government has designated as chemical-biological warfare agents to be monitored and thwarted. Members of the NSABB said that they had concerns concerning "the ease with which individuals versed in, and equipped for routine methods in molecular biology can use regularly available starting material and procedures to derive some SAs *de novo*." The NSABB also mentioned that SynBio "allows expression of agents that resemble and have the attributes of specific Select Agent(s), without being clearly identifiable as SA based on the sequence." To use other words, SynBio opens the door to mixing any toxin from scratch and creating new deadly agents never before seen. As a result, a listing of SAs can never be comprehensive and complete.

Despite this, the NSABB also allowed further SynBio works to proceed with the following argument: "Synthetic biology may be new; but challenges to taxonomic conventional wisdom are not." The NSABB recognized that novel life-forms can evolve into unexpected new life-forms, yet favored allowing further SynBio research to proceed generally unhindered. This is largely because the benefits and positive outcomes from SynBio research have been deemed to greatly outweigh and overwhelm any negatve risks from such research.

A final caution has to do with public health risks and the varieties of biological pathogens that have historically been converted to bioweapons by nefarious persons and states. The Biological and Toxin Weapons Convention cannot regulate, oversee, or steer whatever happens globally in the world of SynBio. Neither can the World Health Organization (WHO). It rests with individual scientists to provide safety and security measures against misuse and abuse of SynBio. Ultimately, synthetic biology means cheaper and widely accessible tools to build bioweapons, virulent pathogens and artificial organisms that could possibly pose grave threats to people and the planet. The danger is not just bioterror but "bio-error"—and mechanisms to prevent both are nonexistent.

Will the Genie Deliver—or Destroy?

Looking at the old paradigm of transgenics, genetic engineering was essentially a cut-and-paste affair in which biotechnologists rearranged pieces of DNA—the self-assembling molecule that instructs living organisms how to carry out every biological process—between already existing species. Today's synthetic biologists can transition from reading genetic code to writing code—to understanding how key pieces of DNA, when combined, sustain life to a point where key pieces can be reassembled to create new and different forms of life. SynBio can create new "genetic networks" and combine those into newer platforms resulting in unique life-forms.

SynBio can now engage in made-to-order life-forms using engineering concepts borrowed from electronics and computing; it can construct simplified versions of bacteria, reprogramming DNA as a computing medium and assembling whole new genetic systems that are entirely human-made. SynBio carries with it the inspirational promise of breakthroughs in medicine, health care, pharmaceuticals, synthetic fuels, and many other products of virtually unlimited benefit and value to future society. In addition, SynBio experts expect to leverage the convergence of nanoscale biology, computing, and engineering toward the creation of new life that transcends the limits of life as we know it. All of this can proceed unfettered and unrestricted as long as the risk dimensions and externalities associated with SynBio are well understood and a risk management system can be emplaced to deal with emerging issues.

Without doubt, widespread debate on the social, economic, and ethical implications of SynBio is needed to sort out the genuine from the mythical so that real risks are plainly understood. The overall benefits of SynBio should not be diminished or dismissed because there is a corresponding risk factor, but instead, strategies are needed to advance SynBio in light of known risks, with due regard for the likely impact of unknown risks that could negate any fruits SynBio conferred.

Nothing should be imposed that thwarts the legitimate onward march of scientific progress and inquiry, which have derived so many benefits to society and will continue to do so. However, a serious discussion must be launched that is not limited to biosecurity issues where we seriously consider, for example, the array of bioweapons/bioterrorism issues and risks that could accrue as well as matters of biosafety (worker safety and environment). More difficult and challenging than developing a national consensus on risk management issues in SynBio, which legitimately extends into agriculture, environment, public health, law enforcement, counterterrorism, proliferation, and military threat arenas, is the question of reconciling the emergence of a global SynBio community where commercial firms, governments, do-it-yourselfers, and criminal terrorists may all have access to the same technology but hold fundamentally divergent aims for its use. Instead, we must converge with pragmatism and expertise, looking at the global array of SynBio endeavors expected to emerge during the 20-year period 2011–31 with an eye toward finding a rational balance between self- and government regulation.

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See Also: Biological Weapons; Centers for Disease Control and Prevention (CDC); Living Modified Organisms; Nanotechnology;Terrorism; World Health Organization (WHO), UN.

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Biological Weapons

Biological warfare, or germ warfare, as it is often called, is the use of biological agents in the form of toxins, bacteria, rickettsia, viruses, or fungi to incapacitate or kill an individual, a specific group of people, or an entire population. Biological warfare may also be used on livestock or crops to affect the food supply and therefore indirectly affect the survival of a population. As a strategic weapon, biological warfare is very effective in posing a credible threat of mass casualties, economic collapse, and the breakdown of society. However, biological warfare is less effective as a tactical weapon, as it may take days or weeks for symptoms of the biological agent to present themselves, and it could be spread to other than its intended victim(s). The longer incubation time for some biological agents makes them ideal as a terrorist weapon, allowing the terrorist to get out of harm's way long before the agent takes effect.

This article expands further on the concept of biological warfare by providing the reader some of the history of biological warfare, the different types and classification of biological warfare agents, indications of a biological attack, and medical management of biological casualties.

The History of Biological Warfare

Biological warfare has been used throughout world history. It has been the weapon of choice by ancient armies to conquer civilizations or assassinate individuals considered enemies of the state.

During the 13th and 14th centuries,the Mongol Empire was one of the most powerful forces on Earth, having conquered most of southeast Asia to eastern Europe. Under the leadership of Genghis Khan, his generals ordered the slaughter of entire populations and the destruction of entire communities to force their enemies to concede to Khan's reign. During one such siege on the city of Kaffa in 1345, the Mongol army was reported to have catapulted the plague-infested bodies of its own troops over the city walls.

In 1763, Fort Pitt, which is now Pittsburgh, Pennsylvania, was under siege by the Delaware Indians in an effort to drive the British out of Ohio. In an attempt to make peace, Captain Simon Ecuyer gave representatives of the Delaware Indians blankets and a handkerchief from a smallpox ward in hope that the tribe would become infected with the disease. Even though some historians believe that the Indians were already infected with smallpox by exposure to soldiers at Fort Pitt and infected settlers, the gift of the infected blankets was an intentional act of biological warfare.

One of the best-known uses of a biological agent as a weapon of assassination took place in 1978. A Bulgarian dissident by the name of Georgi Markov was assassinated by the Bulgarian secret police on the streets of London by injecting a pellet containing ricin into his leg with the tip of a modified umbrella. Ricin is a deadly toxin derived from the castor bean plant.

The most recent use of a biological agent was the 2001 anthrax attacks. One week after the September 11, 2001, terrorist attacks, letters containing anthrax spores were mailed to a number of news media offices and the offices of Senators Tom Daschle and Patrick Leahy. The attack resulted in the death of five people and the infection of 17 others.

Types of Biological Warfare Agents

There are five main types of biological warfare agents: bacteria, rickettsia, viruses, fungi, and toxins. Each of these agents varies widely in its ability to infect humans, its length of incubation, lethality, and effectiveness as a weapon:

- Bacterial agents are single-celled organisms that are the cause of outbreaks of diseases such as anthrax, plague, tularemia, brucellosis, and a number of other diseases.
- Rickettsia are microorganisms that are similar to bacteria but present themselves as parasites that reproduce inside animal cells. These parasites can cause such diseases as typhus, Rocky Mountain spotted fever, or Q fever.
- Viruses are microscopic organisms 100 times smaller than bacteria but unable to grow or reproduce outside living cells. Examples of diseases caused by viruses are smallpox, Venezuelan equine encephalitis (VEE), and viral hemorrhagic fevers, which include Ebola, Rift Valley fever, and yellow fever.
- Fungi can also cause severe diseases in humans, such as valley fever. However, the most effective use of fungi as a biological weapon would be to destroy crops, resulting in widespread hunger and economic disaster. Some examples of fungi that could be used as biological agents include rice rust, cereal rust, and potato blight.
- Toxins are poisons that are produced naturally by living organisms, such as venomous spiders or snakes, or synthetically

extracted from naturally occurring poisons. The most commonly known toxins are botulinum toxin and ricin.

Biological agents can further be classified by their severity and the health risk they pose. The Centers for Disease Control and Prevention classifies these agents in three different categories:

- Category A includes high-priority agents, including those that pose a risk to national security, such as anthrax, botulism, plague, and smallpox. These biological agents are classified as Category A for the following reasons:
    - » Easily disseminated or transmitted from person to person
    - » High mortality rate and could have a major impact on public health
    - » May cause panic and social disruption
    - » Require public health preparedness
- Category B includes the second-highest priority agents such as brucellosis, glanders, ricin, and Q fever. These biological agents are classified as Category B for the following reasons:
    - » Fairly easy to disseminate
    - » Result in moderate morbidity with a low mortality rate
    - » Require extensive diagnostic capabilities and disease surveillance
- Category C is the third-highest category, which includes such agents as hantavirus, yellow fever, and drug-resistant tuberculosis. These biological agents are classified as Category C for the following reasons:
    - » Readily available
    - » Easily produced and disseminated
    - » High mortality rate and major health impact

A National Institute for Occupational Safety and Health crew is suited in full protective gear before entering a simulated biohazard testing area. The exercise was held in early 2012 along with Sandia National Laboratories to test Sandia's Building Restoration Operations Optimization Model (BROOM), a software-based tool to assist in gathering samples following a release of biological warfare agents in public facilities such as airports, transportation centers, and high-traffic public buildings.

Indications of a Biological Attack

Even though it is difficult to detect if a population is under a biological attack due to varying incubation periods or the multiple methods for dissemination, there may be numerous indications of a possible biological attack:

- Appearance of a disease that would not normally occur in that geographic area
- A steadily increasing number of patients showing up at health care facilities with similar symptoms
- The larger numbers of casualties align closely with the wind direction
- Reports from pharmacies on large numbers of specific over-the-counter drugs being sold
- Large numbers of dead animals in an area

Medical Management of Biological Casualties

There are very specific steps to follow in providing effective medical management of biological casualties:

- *Signs and Symptoms:* The victims of a biological attack manifest very specific signs and symptoms depending on the agent used. For example, bubonic plague is characterized by swollen and painful lymph nodes called buboes. Cutaneous anthrax can be identified by black carbuncles and swelling of the victim's skin at the site of infection. Smallpox appears as a rash with the formation of pustules. Because many of these diseases have not been seen for years, it is imperative that medical personnel are trained to recognize the specific signs and symptoms.
- *Diagnosis:* A definitive diagnosis may require some very specific laboratory tests that are not readily available. Therefore, it is important to know which facilities in specific areas have the ability to conduct these diagnostic procedures.
- *Treatment:* Early administration of antibiotics may be critical, depending on the biological agent. For example, antibiotic therapy cannot be delayed more than a day after the onset of symptoms of pneumonic plague. Availability of specific antibiotics, such as ciprofloxacin, may be an issue.
- *Prophylaxis:* Antibiotics may be administered prophylactically for known or suspected exposure. There are also vaccines for such diseases as anthrax and smallpox. However, these vaccines are not readily available to everyone and may require a series of inoculations to be effective.
- *Isolation and Decontamination:* If a disease is readily transmitted from person to person, it is may be possible to isolate the infected to prevent further spread of the disease. Decontamination of surfaces with which the infected have come in contact may prevent further spread of the disease.

Conclusion

This is a brief overview of biological warfare, including some incidents in world history of the use of biological warfare, the different types and classifications of biological warfare agents, indications of a biological attack, and the medical management of biological casualties. This information provides only a baseline for understanding biological warfare. The threat of a terrorist using a biological weapon is a reality. With the advances in medicine and unlocking secrets of the genome, there is a possibility of developing a biological weapon resistant to all medical countermeasures and the ability to target specific populations. Therefore, it is imperative to stay current with the latest information and best practices in preparing for biological warfare.

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See Also: Centers for Disease Control and Prevention (CDC); Chemical Risk; Department of Homeland Security (DHS); Ebola Virus; Epidemics; Federal Emergency Management Agency (FEMA); Food Security; Health and Medical Response Scenarios; Infectious Disease; National Response Framework; Pandemics; Public Health Surveillance; Quarantine; Smallpox; Terrorism; Vaccinations; World Health Organization (WHO), UN.

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Blame, Politics of

Human nature seeks to provide meaning behind events, whether they are natural or human in nature. Even most so-called acts of God such as natural disasters could have been prevented or mitigated through better risk assessment and crisis planning. The political blame game is a public process encompassing numerous interdependent actors, including the news media, government legislative bodies and investigatory agencies, public forums, and social media. The rise of the modern mass media has fueled the political pressure to act on public demands for relief, blame, and accountability. Although blame can play a necessary function in moving beyond crisis, negative institutional reactions of defensiveness, avoidance, and the blame game harm a government or organization's reputation and hinder effective crisis management.

Surviving victims and the general public search for answers in the aftermath of a crisis. The assignation of blame gives disasters meaning. Populations live in areas vulnerable to natural disasters or environmental hazards, corporations do not always balance profitability with safety, and technological advances offer greater convenience coupled with greater risk of disastrous failure. The most common questions raised as a result of a crisis situation are the nature of the crisis (what happened and how did it happen) and the reason(s) for the crisis (why did it happen and was it preventable).

If crises are deemed preventable, the next logical question is who was responsible for failing to prevent the crisis. Answering these questions and assigning blame gives disasters meaning. Historical explanations for crises such as natural disasters, crop failures, disease pandemics, or famine often had a religious basis. Blame took the form of magic, sorcery, or witchcraft accusations or God's anger for human failings (the Wrath of God) and calls for repentance and strengthened faith.

In modern times, blame for natural disasters focuses on human factors that failed to prevent, predict, or mitigate such events. For example, those looking to assign blame ask why populations were living in vulnerable areas or why politicians or residents failed to heed scientific warnings. Blame for technological disasters such as chemical or oil spills, bridge or building collapses, or nuclear disasters often centers on operator error.

The assignation of blame in modern times is especially likely when it is determined that a crisis could have been prevented or mitigated and that the necessary measures were known in advance but not acted upon, even if such omissions were involuntary. The need for blame is also heightened in crises that involve loss of life. Scapegoating places undeserved levels of blame on a chosen individual, group, or organization. Psychological motivations for scapegoating include the need to minimize personal responsibility or guilt and the need to maintain a sense of control. Scapegoats are also chosen based on their political convenience.

Information flow has emerged as an especially critical issue in the politics of blame during the mass media era. Avoidance of the media is both more difficult and less effective. The rise of social and electronic media such as Facebook, YouTube, and Twitter has increased the speed and scope of crisis reporting. Vivid images of damage and struggling victims increase the political pressure to act on public demands for relief, blame, and accountability. Media coverage also fuels the public blame game through sensationalism, misreporting, and bias toward the coverage of conflicts such as the blame game that drive the viewer interest necessary for higher ratings. On the positive side, governments and organizations utilize the media to quickly disseminate information on proactive crisis response and problem-solving actions that can reduce the negative aspects of the political blame game.

Political Uses of Blame and Their Effects

Blame for poor crisis management is used in the promotion of political agendas, including increased or reduced government spending, size, and regulatory or disaster relief roles and calls for increased self-reliance and reduced dependency on government assistance. Excessive planning, bureaucracy, and paperwork requirements ("red tape") are frequently blamed causes of governmental crisis response inefficiencies and delays. Statistical correlations between election years and rises in disaster declarations and allocation of relief funds are another example of the political nature of crisis management.

Blame for crises or failed crisis management is also a common political tool, one which often encompasses historical revisionism or distortion of the facts. Politicians and their constituents tend to be more focused on immediate concerns such as economic development, job creation, budget cuts, or deficit reductions. Precrisis planning and mitigation are often either neglected or pushed to the back burner. Other issues that affect precrisis preparation include either too little or too much planning, lack of coordination between government agencies and levels of government, funding shortfalls, the misuse of allocated funds, lack of political will, poor leadership, and lack of innovation.

The commonly held political belief that governments are obligated to protect their citizenry from internal and external threats is another important aspect underlying the politics of blame. Many observers believe that individual citizens have become less prepared for crisis because of increased reliance on government aid. Blame is then placed on government agencies or officials when that aid is absent or slow to arrive. Nongovernmental organizations (NGOs) such as voluntary, religious, or business organizations usually provide faster crisis relief and recovery aid, as they are less constrained by bureaucracy and have fewer or no paperwork requirements ("red tape") for aid recipients. NGOs, however, are not immune from the politics of blame and its effects on crisis management.

The U.S. government response to Hurricane Katrina and its impact on the U.S. Gulf Coast and New Orleans is held as a leading example of the politics of blame. The modern politicization of disaster relief in the United States began in the second half of the 20th century. Individual citizens had begun to look to the federal government for aid on a large scale during the Great Depression of the 1930s under the Franklin D. Roosevelt administration's New Deal programs. Previously, most crisis relief had come from local, state, or private organizations. The Dwight D. Eisenhower administration was the first granted the authority to make a presidential declaration of disaster areas eligible for federal aid. The federal aid process was further institutionalized and politicized under the Jimmy Carter administration with the formation of the Federal Emergency Management Agency (FEMA) in 1979.

In the aftermath of Hurricane Katrina, sensationalized reports of widespread looting, violence, and rape slowed rescue and relief efforts, as military and law enforcement personnel were either diverted or cautious to enter reputedly dangerous areas. Many of these reports were later proved false. FEMA response was delayed by lack of coordination with state and local authorities, lack of sufficient or accurate information, and excessive bureaucratic requirements for aid dispersal.

The same political issues that contribute to poor crisis management and fuel the blame game also operate within the international aid community. Many developing nations and failed states lack sufficient resources or infrastructure for effective crisis management while housing vulnerable populations. Political motivations for international crisis relief include potential national security impacts of overseas crises and the preservation of international goodwill. Developed nations and crisis relief organizations have received blame for perceived slowness of response, sending aid unwanted by the stricken country's government or with strings attached, ignoring crises such as ethnic cleansing or famine until they become overwhelming, focusing on crisis response instead of mitigation and planning, and inadequate funding, especially for long-term recovery.

Negative Consequences of the Rush to Blame

The rush to assign blame and the organizational responses that drive that rush often have negative consequences for both the organization and the people affected by the crisis. Some governmental and organizational crisis management strategies tend to exacerbate blame. Counterproductive organizational responses to crises that play a critical role in the politics of blame are found across the globe and within all types of organizations. Organizations often adopt a defensive mentality in a crisis situation, which can fuel the desire to avoid media scrutiny and public blame or to place blame elsewhere. A defensive stance may also enhance the perception of justifying rather than honestly analyzing the organization's role in the crisis while giving the public appearance of avoidance of organizational responsibility and insensitivity to those affected by the crisis.

Many organizations seek to avoid media contact while internally handling crisis situations, but such an approach can have unintended negative consequences. Misinformation and omissions, whether accidental or intentional, are likely to be pursued within the professional or social media, resulting in negative publicity. The blame game is also fueled by the inclusion of assumptions, honest misinformation or overly optimistic or pessimistic statements, or outright lies within an organization's information flow during or after a crisis.

Blame that centers on a particular scapegoat ignores the complexity that underlies the chain of events leading to a crisis situation. The blame game also deflects attention away from needed crisis relief and recovery efforts, which is especially harmful in the immediate aftermath of a crisis when timely response is of the essence. Finally, the assignation of blame diverts resources from the accurate identification and correction of the causes of the crisis, and shifts organizational, media, and public focus away from organizational solutions to the crisis, mitigation of its effects, and prevention of similar future crises.

The politics of blame has a strong influence on government crisis management operations, especially within the public sector. Government agencies must manage public expectations that they will actively respond to blame assessments through open, thorough investigation, identification of responsible parties and causal factors, and remedial action. In their rush to recover political goodwill after blame, many governments and organizations tend to rush to disperse crisis relief funds without first establishing an adequate process for the prevention of wasteful or fraudulent use. In the long term, the avoidance or deference of blame often harms an organization's public reputation.

Organizations that maintain awareness of the tendency of these exacerbating behaviors can remain on guard against them, thus minimizing the development of the so-called blame game. There are also a number of factors that mitigate the negative impacts of the blame game. Open, honest acknowledgment of the crisis, its effects, and any individual or organizational responsibility as well as mitigation actions will help alleviate the public desire for scapegoating or blame assignation. A focus on immediate relief and recovery will maintain public and political goodwill while allowing the truth to come out in the later long-term postcrisis assessment process. The process of blame and punitive measures then allows a government or organization to recover from crisis, resume normal operations, and recapture public confidence. Often the individuals targeted as scapegoats are then reassigned, fired, or otherwise removed from their precrisis roles. Such proactive measures are helpful even for those organizations that truly believe they are not or are only partially responsible for a crisis situation or those organizations that wish to avoid open statements of culpability that may make them vulnerable to future litigation. Awareness of the political and emotional nature of crisis situations reduces the negative impacts of the human tendency to blame.

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See Also: Bureaucracy; Electronic Media; Mass Media; News Media; Political and Organizational Leadership; Public Relations; Scapegoating; Social Media.

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Blizzards

A blizzard is a winter storm that has strong winds, significant wind chill, and poor visibility due to blowing snow. The Meteorological Service of Canada uses the following general criteria for issuing blizzard warnings: strong winds reaching 25 mi/h (40 km/h) or greater, visibility of less than 0.6 mi (1 km); cold temperatures; and conditions lasting in duration at least four hours. Blizzards, which can last for days, can create a variety of dangerous conditions. Heavy snowfall and whiteout conditions can make travel difficult to impossible. In whiteout conditions people have become lost even when going only short distances. Exposure to low wind chill caused by strong winds and cold temperatures can result in frostbite and/or hypothermia, both of which pose risks to health and safety. Blizzards are also known to cause power outages, falling trees and branches due to high winds and/or accumulation of heavy snow, frozen water pipes due to the cold temperatures, and flooding from melting snow. Extreme weather events are on the rise, with an increase in frequency and duration attributed to climate change.

Cold temperatures and the presence of ice and snow make winter in many countries a naturally hazardous season. Winter weather conditions can quickly become dangerous, often with little or no warning. Environment Canada issues a variety of severe winter weather watches and warnings to alert the public about the approach of hazardous winter conditions. Winter storms and excessive cold claim over 100 lives each year in Canada. In Canada, blizzards occur most often in the southern prairies, the Atlantic region, and the eastern Arctic. Personal preparedness measures can be undertaken by learning more about the different kinds of winter hazards and how to plan ahead for possible emergencies. Government environmental and weather agencies issue alerts when severe winter weather is on the way and provide information on the causes, characteristics, and potential effects of various winter hazards, including blizzards.

One of the worst blizzards in American history is widely known as the Great Blizzard of 1888. The blizzard brought 40–55 inches of snow to the northeast coast. Along with the heavy snow came snow drifts as high as 50 feet and 45-mile-per-hour winds. Many people were trapped in their homes for weeks because of the weather conditions and the inaccessibility of the railroads. In addition to the trains, telegraph lines, water mains, and gas lines were also located above ground. It is estimated that the storm resulted in over 400 deaths and many more injuries. Thousands of wild and farm animals froze to death in the blizzard. In the wake of the storm, officials realized the dangers of above-ground telegraph, water, and gas lines and moved them below ground. In New York City, a similar determination was made about the trains, and within 10 years, construction began on an underground subway system that is still in use today. With hindsight, there are many instances where poor judgment led to death or injury from blizzards.

Individuals are cautioned not to venture out in a blizzard. If people must go outside, they should dress properly to stay warm, wearing thin layers of loose-fitting clothing to trap body heat and promote air circulation. Outer clothing should be tightly woven, hooded, and water repellent. Because most body heat is lost through the head, people should always wear a hat when it is cold outside. If it is extremely cold, one should cover the mouth and exposed skin with a scarf, neck tube, or face mask and pay particular attention to the wind chill index, which can create dangerously cold conditions. People should be on alert for signs of frostbite by checking for numbness or white areas on the face and extremities (ears, nose, cheeks, hands, and feet, in particular). One should get medical assistance immediately if there are any signs of confusion, slurred speech, stiff muscles, or uncontrollable shivering. These are all symptoms of a potentially fatal condition called hypothermia, which occurs when the body loses heat faster than it can generate it.

Depending on the amount of snowfall, travel can be hampered and highways can be closed. The Canadian Automobile Association advises drivers to slow down when driving on snow-covered roads and leave plenty of distance between vehicles. Winter tires provide traction, which is essential for turning and stopping on wet, slushy, or icy surfaces in colder weather. Windshield washer fluid is necessary in the reservoir with a rating in the minus 40 degrees C temperature range. When driving in bad weather, think caution, plan ahead, and make sure there is enough fuel by keeping the fuel tank at least half full. An emergency car kit should always be stored in the vehicle. The basic emergency kit for cars should include the following items: food; water; blanket; extra clothing and shoes; first aid kit; small shovel, scraper, and snowbrush; candle in a deep can and matches; crank flashlight; whistle; road maps; and a copy of an emergency plan. Additional items that can be kept inside the trunk include sand and/or salt; antifreeze/windshield washer fluid; tow rope; jumper cables; fire extinguisher; and a warning light or road flares.

If people must travel during a blizzard, they should do so during the day and let someone know the driving route and anticipated arrival time. If the vehicle gets stuck in a blizzard or snowstorm, remain calm and stay in the car. Allow fresh air into the vehicle by opening the window slightly on the sheltered side, away from the wind. It is possible to run the engine about 10 minutes every half hour if the exhaust system is working well. Beware of exhaust fumes and check the exhaust pipe periodically to make sure it is not blocked with snow. Remember that potentially fatal carbon monoxide fumes have no smell. To keep hands and feet warm, exercise them periodically. In general, it is a good idea to keep moving to avoid falling asleep. Having a storm readiness plan in place saves valuable time if severe weather such as a blizzard strikes.

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See Also: Climate Change Adaptation; Emergency Public Information; Preparedness.

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Border Disputes

Border disputes involve situations where a certain piece of territory bordered by more than one nation is claimed by two or more of these nations. Some border disputes take place in isolated areas, where the precise boundary between two nations is uncertain, while others involve a long-standing disagreement regarding the territorial limits of two states. Although certain border disputes arise suddenly, others recur over time and with some regularity. In either case, nations, corporations, organizations, and individuals that rely upon a border being open are best served through having a crisis management plan that deals with a contingency plan in the event of a border dispute.

Background

Borders are the geographic boundaries of nations or other political entities such as states, counties, and municipalities. Some borders are natural, such as geographic attributes that present natural obstacles to entry and egress; examples include oceans, lakes, rivers, forests, mountains, and the like. Other borders are political, separating two nations because of an agreed-upon division of territory, reached as the result of tradition, war, or negotiation. Examples of political borders include the United States–Canada border and the Great Wall of China. The state of diplomatic relations between two nations sharing a border often affects the types of controls in place at checkpoints and in other areas.

The presence of a border affects an area in economic, political, and other ways. Historically, taxes imposed on goods brought across a border have constituted a major, if not primary, source of revenue for governments. The proximity of two or more jurisdictions also creates special opportunities that favor border trade. Different taxes imposed on certain goods on different sides of a border make it advantageous for consumers to purchase those goods on one side of the border to avoid these taxes. Different policies related to a variety of other services, goods, and programs also may cause individuals to travel to one side of the border or the other to obtain these. Services, goods, and programs that often differ by jurisdiction include the provision of abortion, alcohol, medical care, narcotics, pornography, prostitution, and the like. Although border disputes often involve disagreements regarding territory on land, such quarrels may also involve maritime matters.

Many positive benefits result from cross-border interactions. Residents of one nation often travel from their homes on one side of the border to their job on the other side of the border. Certain regions, such as Europe, have devised means like the European Union to minimize the disruption borders place on their residents. Conversely, the closing of borders, such as the Blue Line between Israel and Lebanon, can greatly diminish trade and other interactions between individuals who live on opposite sides of the border. Political disagreements or disputes often result in the closing of borders. Even when borders are not closed, many nations establish checkpoints where border control agents can inspect those who wish to cross from one side of the border to the other. Although some areas of the globe have worked to reduce border control, other areas, such as the United States, have increased border security since the 1990s. Incidents or events that close borders cause less disruption if a crisis management plan is in place to assist in such an event.

Planning for Border Disputes

Border disputes that are not managed well can have catastrophic results for individuals living in the border region as well as for the nations involved in the disagreement. For example, in 1978 a group of Palestine Liberation Organization (PLO) operatives initiated the hijacking of an Israeli bus that led to the death of 38 Israeli citizens, including 13 children. Three days after the slaughter, the Israeli army launched Operation Litani, an invasion of the border region of southern Lebanon where PLO bases were located. The Israeli action resulted in the death of more than 1,100 individuals, mostly Lebanese and Palestinian civilians. After Operation Litani ended, the Israelis continued to skirmish with the PLO and other Lebanese factions. By 1985 these conflicts had proven costly to both sides, with many civilians, including women and children, killed as a result of bombings and other attacks launched from southern Lebanon. To meet this challenge, the Israeli Defense Force (IDF) invaded a slim borderland buffer zone in 1985. This buffer zone, known as the Israeli Security Zone, was maintained by the IDF until 2000. The Israeli Security Zone was kept free of weapons or other forces other than those of the IDF. The Israeli Security Zone was intended to prevent mortar fire and other small arms from harming Israeli border towns. As a result of this occupation, however, cross-border traffic was halted and economic harm came to those who had depended on trade between the two nations. Such devastating results spur many government entities to seek alternatives to border disputes that will be less costly and disruptive.

As a means of protecting against border disputes, many nations allocate resources that are used to defend and police their borders. A nation may use its armed forces, civilian police forces, and civil service employees, as well as combinations of these bodies, to maintain order and enforce the law. In the United States, for example, borders are controlled by Customs and Border Protection (CBP). The CBP is an agency of the U.S. Department of Homeland Security and is responsible for enforcing hundreds of statutes and regulations. Created as a result of the decision to merge the U.S. Customs Service and the Immigration and Naturalization Service (INS) as part of a general reorganization of security forces after the 9/11 attacks, the CBP is responsible for three overarching matters: trade, travel, and border security. With regard to trade, the CBP is accountable for ensuring that goods arriving in the United States have the appropriate fees and duties paid to the U.S. government. The CBP also works to ensure that U.S. trade is secure from threats of terrorism, both around the globe and at the borders. For travel, the CBP works to maintain the United States' reputation as a welcoming country while also efficiently processing over 300 million visitors who cross its borders each year. Finally, with respect to border security, the CBP represents the largest law enforcement agency in the United States. This group works to secure the nation while coordinating trade and travel.

Border disputes can disrupt the political and economic well-being of an area. For most residents of an area near a border, cross-border trade and easy entry and egress are seen as great benefits. For that reason, macro regional integration initiatives, such as the North American Free Trade Agreement (NAFTA) and the European Union (EU), are embraced as helping establish cross-border regions that are more resistant to unilateral actions. Such organizations have a twofold effect on border disputes. First, macro regional integration initiatives build support for cross-border integration by creating regional interest in the continuance of cross-border relationships. Increases in intercultural communication and dialogue are augmented by mutual or common financial interests that make serious border disputes less likely. Second, the agreements that establish macro regional integration zones often contain arbitration or other judicial procedures to adjudicate disputes among nations. These avenues assist in achieving a resolution to disputes that stops short of closing down border traffic. Entering into treaties and other agreements with neighboring nations is thus a strong preventive step that guards against crises that may develop as a result of border disputes.

Despite these carefully laid precautions, border disputes still occur, both on land and at sea. Indeed, as schools of certain fish become scarcer and the possibility of harvesting underwater resources becomes more likely, interest in territorial rights to certain sea locations has increased. The governments of the People's Republic of China, the Philippines, and Taiwan, for example, all assert sovereignty over Scarborough Shoal, a group of very small islands and reefs in an atoll shape located in the South China Sea. Although the Scarborough Shoal is uninhabited, antagonism between the three nations, and especially China and the Philippines, continues, and initiatives to resolve territorial disagreements also continue. In 2011, for instance, China and Japan engaged in a series of talks designed to diminish hostilities between the two nations over control of certain maritime areas. The Chinese and Japanese have found that including greater numbers of constituencies in the talks has made it more possible to reach consensus on certain hot topics, such as natural gas exploration and fishing rights. The inclusion of business interests, coastal residents, administrative agencies, and others, in addition to diplomats, made discussions focus on the consequences to the region. If this success continues, other border disputes may well include individuals who represent multiple perspectives.

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See Also: Agency Notification and Mobilization; Arms Control; Civil War; Department of Homeland

Security (DHS); Interstate War; Religious Violence; Terrorism; Weapons Trafficking.

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Bounded Rationality

A discussion of bounded rationality must include a review of two definitions: What is meant by the term *bounded*, and what is meant by the term *rationality*? Limited, circumscribed, finite, and restricted are defining words that suggest parameters of a bounded state or condition. The term *rational* denotes a quality or state of reasonableness, or a sensible, logical, or well-founded condition. The origins of the concept of bounded rationality are historically rooted in commonsense approaches to the art and practice of decision making. The concept has practical relevance to a variety of disciplines: crisis management, crisis negotiation, crisis communication, crisis planning, mediation services, industrial planning, governmental policy making, economics, and individual decision making, to name a few.

Human Limitations for Rationality

The scientific community in the 18th and 19th centuries recognized human limitations that had long been understood but inadequately defined. They recognized that human intelligence had finite capacities or limitations; that the then-current state-of-the-art construction, engineering, and instrumentation technologies were often woefully inadequate to the tasks of producing accurate measurements intended to shed light on phenomena in nature and the constructed world; and that the prevailing theories and observations related to the emerging medical sciences were based on incomplete intelligence or a lack of vital information to make reasonable, if not optimal, diagnoses or decisions.

As late as the Renaissance, European physicians relied on human anatomical information that dated back to the time of Galen, the pioneering Arabic physician of the 2nd century C.E. Galen's anatomical descriptions filled a large gap in medical knowledge, but even Galen's contributions fell short of fully accurate identification of the human skeleton. Anton van Leeuwenhoek, a Dutch lens maker who lived from 1632 to 1723, developed lenses that produced a dramatic 200 percent magnification of what he identified as "animalcules" or single-cell life-forms. The improved lenses led to development of the scientific microscope, which enhanced scientific theorizing and the discovery of bacteria, but it would still take another two centuries for the scientific community to produce lens instrumentation powerful enough to view living viruses. Diagnosis and treatment decisions related to viruses required information that could not exist until visual confirmation of viral life-forms could be confirmed. Medical science remained in a bounded or circumscribed state.

The term *rationality* derived from the Latin and adopted French word *ratio*, defined as a lack of information or intelligence, or more specifically, indicating a finite or incomplete intelligence. In the 20th century, Herbert A. Simon refined this informal concept, pointing out that for rational decision making to occur, cognitive limitations, the extent to which individuals are bounded by lack of adequate information, lack of intellectual capacity, and available technical and computational capacity needed to be taken into account in order to make reasonable decisions. Simon argued that a rational action implied behaving in a manner appropriate to a particular situation—to the specific context in which a decision is made. Emotional factors such as fear must be considered as influences that bind or restrict the development of an optimal decision. Physiological and psychological limitations associated with fear, stress, and the fight or flight syndrome, as described in the general adaptation syndrome developed by Hans Selye, constitute factors that may contribute to less than rational or reasonable decision making. The psychological effects of very high levels of stress are well established. The human capacity for sustained attention or the ability to concentrate is diminished, and how an individual perceives what is required for optimal decision making can become altered by real or even imagined crisis situations. What will satisfy immediate or near-term safety or survival may reduce thinking processes to acting upon and accepting a very limited range of what Simon called "satisficing" or satisfactory decisions.

Influences of Locality on Decision Making

A factor that may limit the selection of an optimal decision is a decision maker's regional or local geographical setting. Individuals and groups are influenced by their physical and cultural environments. Planners and decision makers who have long resided in desert climates may contribute prejudiced policy recommendations on planning for hurricane preparations. Regardless of how much we are convinced that our recommendations are detached and objective, we may tend to generate less than optimal decisions.

This very human problem of restrictions on our cognitive processes is described as "local rationality." The problem is not an immediate concern to populations that are not at significant or immediate risk. From a crisis management perspective, governmental agencies are frequently confronted with potential environmental or safety policy decisions that result in public opposition, often referred to as NIMBY or "not in my backyard" issues.

Local rationality has significantly influenced national governmental decisions on where and how to safeguard or dispose of weapons-grade chemical and radioactive waste that will pose serious threats to human health for thousands of years. Billions of U.S. tax dollars were spent on selecting, excavating, and preparing a remote site in the state of Nevada (Yucca Mountain) to house such waste for thousands of years or until advanced waste remediation technologies could be safely employed to reduce risks of radiation exposure.

Despite the fact that Yucca Mountain was ready to accept waste, the site was never opened. Fear of future radiation exposure in the large Las Vegas urban area was a critical factor in halting the opening of the Yucca Mountain site.

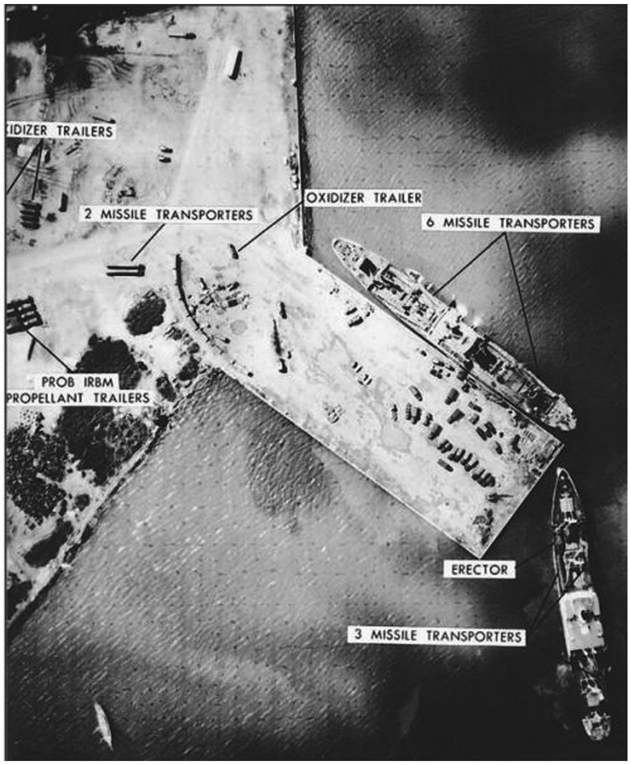
Time- and Cost-Bound Influences

Reasoned or rational decision-making processes should include realistic outcomes that would produce a beneficial outcome, and the decision-making process would factor in cognitive and organizational constraints that might result in a weaker decision. Decision planning guided by these constraints is understood to be adaptive or conducted within rationally bounded guidelines or parameters. Daniel Hahnemann and Amos Tversky found that decision processes occur within time- and cost-bound realities, and even when optimal technologies and expertise are available to decision makers, the optimal decision may not be made. Planners often arrive at "satisficing" or acceptable decisions.

An optimal decision would require planners to possess all the currently available and appropriate information vital to informing a decision. All known alternative decisions would also need to be factored into selecting a decision. Influencing factors such as cost-benefit analysis of each alternative would need to be evaluated to determine the action that would result in the safest, healthiest, most fiscally cost-efficient, most timely, and most appropriate decision.

The Influence of Personal Views

Decision analysts report that results may not be predicted with a high degree of certitude. Important decisions involving the safety or security of communities and nations are fraught with elements of human emotion and personal agendas that may not be readily apparent even in the most organized and objective planning processes. In the United States, a large percentage of the population view driving an automobile as a basic right. Governmental efforts to develop high-speed and light-urban rail transport have met with mixed results, and public opinion and automobile-related businesses and industrial interests have long campaigned against these forms of transportation. Yet, with each significant spike in gasoline prices, American drivers have increasingly turned to available rail and bus transport to save money. It is evident that emotion, cost, time, and availability are critical factors in the bounded



This 1962 U.S. Department of Defense photo shows Soviet missile equipment being loaded at a port in Cuba. The Cold War's tense Soviet–American relations came to a head in October 1962 during the Cuban Missile Crisis.

rationality equation when an individual chooses to drive or take a bus or train to work or to market, providing that alternative forms of transport are actually available. It is important to recognize that transport planners are also members of the public, and their own deeply held views on the rights or abuses of the personal automobile are factored into policy planning regardless of how much effort is put into detaching emotional and personal inputs.

Alternative Decision Possibilities

Developing alternative decision options is essential, particularly when efforts to reach an agreement reach an impasse. The 1962 Cuban Missile Crisis between the former Soviet Union and the United States provides a case in point. After tense communications between President John F. Kennedy and Soviet Premier Nikita Khrushchev, the United States decided to halt a naval blockade of the island nation of Cuba, where the Soviet Union had constructed missile silos and awaited Soviet fleet shipments of nuclear weapons. The Kennedy administration committed to withdrawing nuclear weapons from Turkey, a country that bordered the former Soviet Union, if the Soviet Union would withdraw missile shipments. The Soviet Union returned the nuclear missile cargoes to Russian ports. Both governments saved face, as the two superpowers backed away from the brink of a possible nuclear war.

The Kennedy administration reviewed numerous alternatives in seeking to resolve one of the gravest political and military crises since the end of World War II. Both leaders and their governments were bounded or constrained by political and military agendas. The decision-making process was time-bound in a dangerous face-off as Soviet cargo ships neared the U.S. blockade. Both governments arrived at what could best be described as a rational decision. They averted a catastrophe of global proportions and crafted a decision based on reason.

Adaptive Optimizing Decision Making

Bruce Bueno de Mesquita informs planners that they should approach the decision-making process in an "adaptive" manner, always adapting to be flexible to changes and limitations of the specific environment in which their decision planning takes place. However, decision makers must recognize that their organizational culture may not allow for decisions that are in opposition to their stated program planning mission and goals. Regardless of time restrictions, environmental conditions, cost, and idiosyncratic constraints, decision planners must establish protocols that seek an optimal decision among the alternatives considered.

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See Also: Decision Making; Decision Making, Theories of; Decision Making Under Stress; Decision Stream; Decision Support Tools; Groupthink; Political and Organizational Leadership; Uncertainty.

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Brain Drain

The term *brain drain* refers to the migration of skilled workers and their families to other countries or regions. Human capital flight is primarily from developing countries to industrialized or oil-rich countries, but its effects are also a concern in some industrialized countries. Brain drain can be long term, such as decades of emigration from African nations, or form a rapid crisis such as the emigration from East Germany to West Germany between 1945 and 1961 in which 20 percent of the population, mostly skilled, resettled.

Social Factors Driving Brain Drain

Brain drain is driven by demand for skilled labor. Underlying social factors that motivate brain drain include poverty, economic depression, low pay, currency devaluation, crisis and conflict, political chaos and corruption, crime, falling educational standards, inadequate infrastructure, services and health care, and environmental collapse. Host countries attract skilled workers with their robust economic outlook, higher salaries, quality schools, strong infrastructure and services, and social stability and mobility. Sixty percent of world migrants move to developed countries; the remainder is between developed countries. There is limited migration from developed countries to developing ones. Ninety percent of highly skilled migrants live in the nations of the Organization for Economic Co-operation and Development; of this population, 85 percent live in the United States, Canada, Australia, the United Kingdom (UK), Germany, and France. Seventy percent of temporary migrants in the United States are highly skilled, whereas they form only 40 percent in the UK and Canada and 15–30 percent in France.

This asymmetrical skill flow is attributed to the lower linguistic adjustment required of migrants moving into countries where the lingua franca English is spoken. Brain drain severely impacts sub-Saharan Africa, Caribbean islands, India, China, Vietnam, Pakistan, Indonesia, and former Soviet states. Key industries damaged by brain drain include health and medicine, business services, banking and finance, computers and information technology, and industrial high tech. Between 1990 and 2000, international migration expanded by 14 percent, and the result was an increase from 154 million to 175 million people living in host nations. The brain drain is more extensive today than two decades ago because skill-selective immigration policies in Australia, New Zealand, Canada, and the United States attract the top workers.

Crisis and Political Influence

Crises or major political shifts encourage brain drain. For example, due to political upheaval between 1989 and 1997, 233,000 South Africans permanently emigrated to the UK, the United States, Canada, Australia, and New Zealand. Due to economic and environmental problems, 80 percent of skilled workers have left the small Caribbean-basin countries of Guyana, Jamaica, Haiti, Grenada, and St. Vincent and the Grenadines, producing one of the most brain-drained regions in the world.

Migration is motivated by the income differential between developing and industrialized countries. Nigerian medical schools and hospitals have lost many of the most talented practitioners because they receive far better salaries in countries like Saudi Arabia. Working conditions and equipment in developing countries are often inadequate, leaving human talent and potential underutilized. Engineers, scientists, and researchers from India, China, and Korea have moved to countries like the United States in great numbers to take advantage of better pay, benefits, and living conditions. Migration networks form and stimulate community migration; a sequential migration chain emerges, with settled migrants housing new arrivals. Generalized reciprocity supports migrants until they are self-sufficient.

Positive Outcomes

Positive effects of migration include an overall improvement in migrant child health outcomes, lower infant mortality, and greater birth weights; however, migrant infants were less likely to be breast-fed and vaccinated. Feedback effects like money remittances stimulate migration, and they represent an important source of income in many developing nations. Remittances form the largest external input on the economy of Haiti, for example. However, most benefits from migration are internalized in the host nation, and money remittances only trickle back. Money remittances are usually spent on consumer goods and not placed in productive investments that act as multipliers. Return migration of individuals with new skills represents potential gains. The establishment of business networks in source and host nations can stimulate trade and the flow of knowledge. Overall, however, the negative effects of brain drain exceed the positive aspects of “brain gain” when one considers how the acquisition of language skills slows the productivity of the newly arrived, especially in non–lingua franca host countries. Plus, many skilled migrants are hired to do menial work for which they are overqualified, resulting in “brain waste.” Incomes for brain waste jobs are lower, and educational assets are left fallow.

Negative Outcomes

The brain drain has negative impacts in source countries. Economic costs include government spending on training individuals who migrate with skills acquired at taxpayer expense. Middle- and low-income countries are left with a smaller number of workers possessing a tertiary education compared to high-income countries. The loss of creative and entrepreneurial professionals slows job creation and impedes efficiency. When parents emigrate and leave their children behind, the children’s educational attainment is lower. Brain drain also diverts attention away from domestic problems and investment because professionals orient their skills and resources to other nations. The departure of skilled professionals results in the loss of international recognition in institutions, the overworking of those who remain, the use of under- or less-qualified replacement workers, weaker modeling in the workplace, and the erosion of morale in postgraduate education, and, in the context of health care, has negative implications for the health of the citizenry. The brain drain results in the loss of present and future savings, collected taxes, taxpayer investment in education, and sources of leadership.

Mitigation of Brain Drain

Various methods can mitigate the stresses caused by brain drain. Governments may increase the net incomes of the highly skilled and decrease the redistributive taxation that operates at their expense. If governments want to keep the highly skilled and the system of redistributive taxation, education and public discourse need to persuade citizens that taxation is beneficial for the common good. Proactive policies that recruit skilled foreigners can help turn brain drain into brain gain. While it may be desirable to offset brain drain losses with open immigration policies, in many states this incites nationalist anti-immigration sentiments. Government bureaus that only handle skilled personnel may offset this hostility.

Host countries can support education in source countries with money and expertise in critical areas so that individuals need not settle abroad for education. Source enterprises can upgrade human resources by offering training. Host and source countries can also require temporary migration with circulation back to the source country. Governments can produce more high-skills graduates and improve living conditions through security and economic opportunity. As women have lower migration potential than men, affirmative action on the basis of gender may be considered. Placing limits on the amount of currency that can be taken out of a country may also diminish the attractiveness of migrating.

Strengthening loyalty can be accomplished by cultivating community bonds and breaking the culture of anonymity so that there is an emotional cost to emigration. Citizens will stay if they are proud of their nation's political, legal, economic, educational, and social institutions. Another policy that may slow brain drain outside the Anglophone world is the affirmation of linguistic territoriality wherein the national language is prioritized over the English lingua franca. Governments can assert the dominance of the territorial languages throughout public education. Host governments can impose compulsory education in the national language and culture to encourage assimilation.

Corruption, nepotism, and the lack of accountability need to diminish just as law, order, meritocracy, and justice need to increase in the source country. To stem the loss of health care professionals in developing countries, providers need to be better remunerated, restrictions on private practice lifted, a stable currency exchange rate adopted, interest rates on loans regulated downward, budgetary allocations for health care increased, and more scientific research projects funded; medical education should shift its emphasis from curative to preventative medicine to increase regional relevance and decrease advantages on the international market. The government can also regulate professionals who seek international opportunities in order to negotiate the migrant's length of stay abroad, and temporary or permanent returnees should be encouraged to share their skills and knowledge.

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See Also: Immigration; Interdependence; Mutual Aid and Assistance; Poverty; Scenario Planning.

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Bridges

Bridges are essential engineered and constructed structures that support elevated roadways for transporting vehicles, trains, and foot traffic over waterways, roads, valleys, and transportation obstacles such as cities and railway yards. The safety of bridges is often taken for granted by the public, and bridge failures that result in mass casualties have been rare until the last decade. Bridges in many parts of the world are aging and have outlived their engineered life spans and need to be replaced or retrofitted. Thousands of obsolete bridges remain in use. Obsolete bridges are often structures that were constructed over a century ago; they may not be unstable but they are not capable of sustaining the weight loads of today's vehicles, nor can they provide the multiple lanes needed to support the increasing volume of traffic. Bridges also provide terrorists with targets of opportunity.

Recent Bridge Engineering Research Findings

In 2009, the American Society of Civil Engineers (ASCE) issued findings on the safety of critical infrastructure in the United States. The study assigned letter grades on the safety of dams, highways, levees, sewers, and bridges. On a graded scale of "A "to "F," bridges received a grade of "C" due to the high number of unsafe bridge findings. The report found that 26 percent of U.S. bridges were structurally deficient. For a bridge to designated as structurally deficient, it must have a defect significant enough to require posted weight load limits, speed restrictions, and signage warning of flood dangers in locations where flooding regularly occurs. Internationally, bridge safety was evaluated in a 2009 technology study that identified bridge strikes, where bridges are struck by objects such as barges, boats, and locomotives. Large-object strikes accounted for a high number of bridge failures in the United States and Europe but accounted for few collapses in other parts of the world, often due to underreporting. Bridges carrying overloaded vehicles and trains were identified as the most frequent factor contributing to bridge failures. Although the 2007 Minneapolis bridge collapse involved multiple causes, overload was determined to be a contributing factor. Increased weight loads and increased numbers of vehicles on the road have put unmanageable strains on aging bridges.

Bridges in the United States and Canada are engineered for safety and serviceability for a period of approximately 50 years. A large number of them are at least 43 years old and approaching the need for replacement. Of 600,000-plus U.S. bridges, 12 percent were found to be structurally deficient in 2008, and almost 15 percent were described as functionally obsolete. In rural areas, 25 percent of bridges were deemed to be structurally inadequate, as well as 30 percent of urban bridges. Motor freight traffic has increased by nearly 50 percent in the last 20 years, and urban areas account for the largest share of traffic in the United States, indicating that urban area bridge safety is a critical public safety concern. Bridges that are in the process of being constructed account for the second most frequent cause of collapses worldwide.

Bridge Protection Against Terrorist Attack

A commission comprising governmental, engineering, scientific, and security experts convened in the United States reported that nearly 1,000 of the 600,000-plus bridges in the United States were vulnerable to terrorist attack. The commission called for risk assessment evaluations of bridges, enhanced security measures, and structural retrofitting to diminish the potential for terrorist activities. As recently as May 1, 2012, five men describing themselves as anarchists were arrested planning to blow up an urban, highly trafficked bridge in Cleveland, Ohio. Worldwide, in May

Case Study: Recent Bridge Crises

The highly trafficked Interstate 35 West Bridge spanning the Mississippi River between the U.S. cities of Minneapolis and St. Paul, Minnesota, collapsed during the evening rush hour on August 1, 2007. The Interstate 35 bridge failure brought about reviews of bridge structural integrity and safety around the industrialized world. The catastrophe resulted in 145 reported injuries and 13 fatalities.

In western Europe, on March 5, 2011, a bridge constructed in 1885 linking the Portuguese communities of Catelo de Paiva and Penafiel collapsed, resulting in the fatalities of a busload of 60 passengers and 10 people crossing the bridge in personal and commercial vehicles. The 1885 bridge was determined to be obsolete and not designed for today's significantly increased volume of traffic, larger vehicle sizes and weight loads, and speed capabilities of modern vehicles.

In Asia, bridge failures have become a recurrent safety problem. In the People's Republic of China during July 2011, three bridges collapsed, reportedly due to incorrect proportions of sand mixed with concrete used to construct the bridges. In one of the failed bridges, trucks had been prohibited by law from crossing the bridge due to their heavy loads that caused bridge destabilization. Police video surveillance cameras revealed that late-night truck crossings were responsible for destabilization of the bridge and contributed to its subsequent collapse. Over 1,000 trucks were identified making unauthorized crossings, often carrying loads of more than 100 tons.

2012 three completed terrorist attacks on bridges resulted in explosives detonated in Myanmar and India, and one bomb scare occurred in Kenya.

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See Also: Critical Infrastructure; Dams, Levees, and Seawalls; Floods, Post-Traumatic Stress Disorder; Sabotage; Safety Policies; Suicide Bombing; Terrorism; Transportation Security; Vulnerability.

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BS 25999

BS 25999 is an internationally recognized business continuity management (BCM) standard developed in 2006 by the British Standards Institution (BSI) in consultation with the UK business community, replacing the Publicly Available Specification 56 (PAS 56) issued on the same subject in 2003. The standard provides a basis for understanding, developing, and implementing business continuity plans within an organization and a comprehensive set of requirements based on BCM best practice covering the whole BCM life cycle. The requirements in the standard are generic and are intended to be applicable to all organizations, regardless of type, size, and nature of business. The standard is divided in two parts: BS 25999-1 and BS25999-2.

Since June 2010, it is one of three standards (alongside the National Fire Protection Association's NFPA 1600 and the ASIS International's ASIS SPC-1) that the U.S. Department of Homeland Security (DHS) officially adopted for its Voluntary Private Sector Preparedness Accreditation and Certification Program (PS-PREP). From December 2010, the American National Standards Institute (ANSI) has approved the ASIS/BSI BCM.01 2010 standard for business continuity management that shares much of the core of BS 25999, while reflecting the differences in the U.S. infrastructure, systems, and terminology.

Other equivalent internationally recognized standards are the ISO/PAS 22399: Guideline for Incident Preparedness and Operational Continuity Management published in 2007 by the International Organization for Standardization (ISO) and the AS/NZS 5050: Business Continuity Managing Disruption-Related Risk published in 2010 by Standards Australia.

BS 25999-1

The first part of the standard, BS 25999-1:2006 Business Continuity Management: Code of Practice, was published by the BSI in December 2006 and provides an overview of the principles, processes, and terminology of business continuity planning and protecting critical functions during times of crisis. It sets out the various stages in developing, implementing, and maintaining a business continuity management system (BCMS) and outlines the requirements for achieving the BSI's business continuity certification.

BS 25999-1 starts by defining the scope of the standard and clarifies that it describes generic best practice that should be customized to the needs and wants of the organization implementing it. It then provides a short overview of a BCMS, describing its various processes, relationship with risk management, and the reasons and benefits for an organization to implement it. Central to this implementation is having a clear, unambiguous, and appropriately resourced BCM Policy and a Programme Management for which the standard defines an approach. This approach, which is perhaps the most comprehensive of all standards, describes the BCM Programme Management as a four-stage life cycle that aims to embed BCM into an organization.

The first stage is labeled "understanding the organization." The organization and its critical activities, resources, duties, obligations, threats, risks, and overall risk appetite need first to be understood before moving to the second stage of designing appropriate business continuity strategies and tactics. The third stage involves the development and implementation of the tactical means (incident management structures, incident management and business continuity plans) by which business continuity is delivered within an organization. The fourth stage is concerned with the exercise, maintenance, and review processes that will enable the business continuity capability to continue to meet the organization's goals. All these efforts should aim not at a BCMS that exists in a vacuum but to become part of the organization's culture and the way that it is managed.

BS 25999-2

The second part, BS 25999-2:2007 Specification for Business Continuity Management, was published by the BSI in November 2007 and features largely the same content as the first part but with greater detail with regard to the specific activities by which a BCMS can be developed, implemented, and maintained. It is organized, similarly to the first part, in four main phases: Planning the BCMS, Implementing and Operating the BCMS, Monitoring and Reviewing the BCMS, and Maintaining and Improving the BCMS.

In the planning phase, the program requirements are determined and the scope and objectives of the BCMS are identified by taking into account the organization's strategic objectives, key offering (products/services), risk appetite, and all possible regulatory or other restrictions. These requirements and objectives form the basis of the BCM policy, which documents the management commitment to the BCMS and should be communicated to all organization members. This phase also involves the allocation of the resources necessary to oversee, implement, and maintain the BCMS; the training and development required; and the processes to manage the documentation and records created as a part of this implementation.

The implementing and operating phase begins with the business impact analysis (BIA), which, according to Section 4, enables an organization to "determine the impact of any disruption of the activities that support the organization's key products and services." The BIA helps the planner to understand the organization's "key" and "critical" business processes (not the same when it comes to prioritizing recovery) and their interdependencies as well as to quantify the potential consequences of an operational disruption in monetary terms. Next, the organization identifies ways to mitigate potential business disruptions by reducing their likelihood, limiting their time frame, or reducing their impact and defines strategies by which it will respond to and recover from them, including relationships with key internal and external stakeholders. These strategies will form the basis for the design of the organization's incident response structure, that is, the identification of people, the development of BCM plans, and the allocation of resources to respond to incidents, trigger an appropriate business continuity response, communicate with stakeholders, and manage the resumption and recovery of business processes.

The monitoring and reviewing phase ensures that the organization undertakes regular independent reviews of the BCMS to determine whether it conforms to planned requirements, has been properly implemented and maintained, and continues to meet the organization's BCM policy and objectives.

The maintaining and improving phase involves the continual improvement of the BCMS's effectiveness through the review of policy and objectives, audit results, analysis of monitored events, and the application of preventive and corrective actions.

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See Also: Business Continuity Management; Business Continuity Planning; Business Continuity Planning Life Cycle; Business Impact Analysis; Business Resumption Planning; Criticality Assessment; Incident Response; Response; Risk Assessment; Stakeholders.

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Budget Crisis

There are several different types of budget crises that a government may experience; all have as their defining characteristic the fact that a government does not have sufficient funds to continue to operate and meet its obligations. One type of crisis has its roots in politics, as competing political parties become unwilling or unable to work together to pass a budget that provides sufficient funds for the government to continue to function; the U.S. government has experienced this type of crisis several times in the past few decades. A second type of crisis is when a government's revenues are not sufficient to fund its operations and it is not allowed to carry a deficit; some U.S. states and cities were facing this type of crisis as of 2012. A third type of crisis, a currency crisis, is related to foreign exchange rates; this type of crisis is most common in countries with emerging economies, such as Mexico and Chile. Yet another type of crisis is exemplified by the eurozone crisis that began in 2009, in which a government's debt becomes so large in relation to its gross domestic product (GDP) that lenders believe it will not be able to meet its obligations, but the country's choices to resolve the situation are limited because it is part of a currency union including other countries.

Political Budget Crises

In the U.S. political system, the president presents a proposed budget to Congress each year. The budget is modified in the House of Representatives and the Senate, and when a budget is passed by both houses of Congress, it must be signed by the president before it becomes law. Appropriations for discretionary spending (including the military and some social programs) must be specified each year, and most debates about the federal budget involve discretionary spending, although the greater part of the U.S. budget is concerned with mandatory spending for programs such as Social Security and Medicare, also known as entitlement programs.

The power to pass the budget is deliberately shared between two branches of government as part of the balance of powers, but it can raise practical difficulties because budget negotiations sometimes turn into showdowns between the two parties, particularly if one party controls the House and the other controls the Senate, or if the president is from one party and the Congress is controlled by the other party; some less generous observers have likened these negotiations to a game of chicken, in which each party is trying to force the other to blink first.

Between 1980 and 1995, the United States experienced nine gaps during which the previous year's budget had expired and a new budget had not been passed; these gaps ranged from a few hours to several days. For instance, in November 1981, about 240,000 nonessential government employees were ordered to go on furlough (it lasted only one day); in October 1984 and October 1986, about half a million government workers were sent home in the middle of the day but were back at work the next, resulting in a half-day furlough; and in October 1990, national parks and museums were shut down over the Columbus Day weekend because a budget had not been passed to pay the workers. Government shutdowns draw attention to budget issues but are costly, due to lost revenues and the fact that historically federal workers have received payment for furloughed days retroactively; for instance, the General Accounting Office estimates that the October 1990 shutdown cost the government about $1.7 million.

However, the longest federal budget crisis in the United States took place in fiscal year 1995–96, when nonessential services were suspended for a total of 28 days: November 14–19, 1995, and December 16, 1995–January 6, 1996. A report prepared by the Congressional Research Service cited many effects of these shutdowns, including the following: the Centers for Disease Control and Prevention ceased disease surveillance; cleanup of toxic wastes was suspended at 609 sites; hiring of 400 Border Patrol agents was delayed; 368 National Park Service sites were closed, as were numerous national monuments and museums, affecting an estimated 9 million visitors; some 20,000–30,000 requests for visas (from foreigners) and 200,000 requests for passports (from U.S. citizens) went unprocessed; services for veterans were curtailed; and employees of some federal contractors were furloughed without pay.

Budget Shortfall Crises

U.S. states are generally required to balance their budget each year, so they cannot run a deficit as can the federal government. This poses a particular difficulty when the economy is in recession, because tax revenues decline just as demand for government services increases, and political realities make it difficult for legislators to pass, and governors to sign, legislation approving new taxes or tax increases. California is an example of a state that has had to deal with a series of budget crises each year since 2008 and has dealt with them primarily through budget cuts. In May 2012, Governor Jerry Brown announced that the state was facing a shortfall of over $15.7 billion and proposed $8.3 billion in spending cuts, with more cuts to be necessary if voters did not approve proposed temporary tax increases. The effects of the proposed spending cuts include cancellation of most summer school programs for public school students; staff cuts and increased student-teacher ratios in public schools; increased tuition and fees and larger class sizes in the state colleges, universities, and community colleges; involuntary, unpaid furloughs for some state workers; reduced coverage under the state's Medicaid program; reductions in the state's welfare program; and increased deportations of noncitizens held in state prisons.

NOSOTROS TAMBIÉN SOMOS DE LA CÚPULA DE ANONYMOUS
EL ORO DEL BANQUERO = LA SANGRE DEL OBRERO
LA BANCA ! NO con nuestro dinero !
OCRACIA
REAL
CORRUPTO
VERITAS
LIBRO

A demonstration against the Euro Pact in Cadiz, Spain, June 19, 2011, attracts protesters from various cities. The Indignant Movement organized a rally in Madrid against the 2011 Euro Plus Pact, in which some European Union member states would be required to commit to certain political and fiscal reforms such as debt brakes and uniform budget guidelines. The Euro debt, sparked by causes such as unsustainable levels of social benefits and high-risk borrowing and lending, has created an economic crisis in several countries.

Case Study: The Eurozone Crisis

A goal of the European Union (EU) is for all EU countries to use a common currency; the euro was introduced in 1999 (for electronic funds transfers) and 2002 (in physical form) for this purpose. Theoretically, all countries in the EU are required to adopt the euro after meeting certain requirements, but as of May 2012 only 17 countries in the EU have done so. These countries (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain) form the Eurozone. There are several competing narratives of the Eurozone Crisis, also known as the European Sovereign Debt Crisis, as well as competing theories as to the best way to resolve the problem. Contributing factors may include real estate bubbles in many countries, trade imbalances, high-risk borrowing and lending, the choice of government to take on private debt burdens, low interest rates on U.S. bonds and Treasury bills that caused investors to seek other investment opportunities, and unsustainable levels of social benefits promised by governments. The phenomenon of contagion appears to be relevant, as a crisis in one country (Greece) spread fairly quickly to several others (Ireland and Portugal) without any changes in the fundamentals of the other countries, and it threatens the ability of other countries, including Italy and Spain, to borrow money at reasonable rates.

The 1992 Maastricht Treaty requires members of the EU to limit their levels of debt and deficit spending to specified levels; however, some countries were able to mask their debt and deficit levels. This problem came to light in December 2009, when Greece announced that its debt amounted to 300 billion euros ($442 billion), constituting 113 percent of Greece's GDP; by contrast, the maximum debt limit allowed in the Eurozone is 60 percent. In January 2000, the EU reported serious irregularities in Greek accounting practices, and the country's 2009 budget deficit was determined to be 12.7 percent rather than the previously reported 3.7 percent; in April 2011 it was revised upward again, to 13.6 percent of GDP.

Although Georgios Papandreou, prime minister of Greece, insisted his country would make good on all its debts, the spectacle of a possible Greek default caused investors to look more closely at the balance sheets of other Eurozone countries with high levels of debt—most immediately, Ireland and Portugal. In May 2010, the EU and the International Monetary Fund (IMF) provided a bailout package of 110 billion euros to Greece; in November they provided a bailout package of 85 billion euros to Ireland, and in May 2011, a 78 billion euro bailout package to Portugal. In July 2011, a second bailout package was provided to Greece, worth 109 billion euros ($155 billion). Although Greece, Ireland, and Portugal have relatively small economies, one fear was that the crisis would spread to the larger economies of Spain and Italy, both of which were being charged high interest rates due to the fear that they would be unable to repay the loans on time; in August 2011 the European Central Bank began buying Italian and Spanish government bonds in an attempt to keep this from becoming a self-fulfilling prophecy.

Delivery of the bailout package was contingent on Greece's adopting austerity measures cutting government services, which were highly unpopular; some economists also argue that the austerity measures are making the crisis worse, because if no one has money to spend, businesses can't make money and thus they will not pay taxes, reducing GDP and making it that much more difficult to pay off the loans. The seriousness of Greece's budget problems is demonstrated by the fact that Greek debt was also restructured in March 2012, with private-sector creditors agreeing to accept only 46.5 percent of the face value of the Greek bonds they held. In national elections held in May 2012, the two political parties supporting the austerity measures, New Democracy and PASOK, received relatively small proportions of the vote while antiausterity and extremist parties did unexpectedly well, increasing speculation that Greece might drop out of the Eurozone and go back to using its own currency, the drachma. Some economists believe this might be a good thing, although it would cause hardship in the short term, because Greece could devalue its currency to make its goods and services more attractive on the international market.

Currency Crises

The world saw several currency crises in the 1990s, including the "tequila crisis" in Mexico in 1994, which affected other countries in Latin America, and the Asian currency crisis of 1997–98. Bates points out that financial crises in emerging market countries (such as Chile in 1982 and Mexico in 1994) differ from crises in mature economies and highlights two major differences: in emerging market countries, private debt contracts tend to have short durations (e.g., one month versus the multiple years common in a country such as the United States), and debt is often denominated in a foreign currency such as the U.S. dollar. Both factors are influenced by the fact that inflation risk is generally much higher in emerging economies than in industrialized countries, and the use of short-term contracts and foreign currencies perceived to be more stable offers the lender some protection from this risk.

A foreign exchange crisis often precedes a financial crisis in an emerging market country: if the exchange rate of the country's currency drops while the debt is denominated in a stable foreign currency, that has the effect of rapidly increasing the amount owed. A currency crisis also affects the ability of individual businesses within a country to obtain foreign financing because it increases their debts and lowers the values of their assets; if businesses do not make money, they do not pay taxes, and this means the government has less money to operate with just when it may need it most. A foreign exchange crisis can also trigger a banking crisis because loans to domestic firms may be denominated in a foreign currency, while the firm does business in the local currency; if the value of the local currency drops sharply relative to the foreign currency, many firms may be unable to pay back their loans. The banks may be forced to cut back on lending, slowing economic activity in the country, and in the worst case a foreign exchange crisis may lead to bank runs and bank failures. The fact that debt contracts are generally of short duration in emerging economies can also magnify the effect of a foreign exchange crisis. While firms in industrialized countries can expect to borrow money for long periods at fairly stable rates, those in emerging countries may need to reprice their debt each month, and interest rates can increase rapidly in response to perceived increases in inflation risk.

Currency crises can spread rapidly from one country to another in a region, a phenomenon sometimes referred to as "contagion"; one example of this type of spread was observed in the 1997–98 Asian financial crisis. The crisis began in July 1997 with the devaluation of the Thai baht and was followed within a few months by currency crises in Malaysia, Indonesia, and South Korea. Although trade linkages are sometimes a factor in the spread of currency crises, Paolo Pesenti and Cedric Tille note that they are not necessary and that a currency crisis may spread even if the countries affected do little or no trade with each other, making the label of contagion questionable, but the term is in common use and its meaning is clear. Several factors may precipitate or facilitate the spread of a currency crisis from one country to another: devaluation of one currency makes that country's exports more attractive on the international market, potentially harming export sales from other countries; creditors may recall loans to country B out of reaction to a crisis in country A, and thus precipitate a crisis in country B, where none previously existed; and because creditors often rely on general information about a region rather than specific and detailed information about each of the countries involved, they may become less confident about lending money to all the countries in a region even if only one is undergoing a crisis.

Foreign exchange crises are often driven by beliefs as well as by market fundamentals, and may become self-fulfilling processes driven by what investors call strategic complementarity: the urge to mimic what one believes others will do. For instance, if one believes that a country's finances are not sound and that other investors will withdraw their funds, one has an incentive to withdraw his or her own as well; if enough people act in this manner, it can create a currency crisis even if there is not a fundamental economic basis for one to occur.

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See Also: Blame, Politics of; Bureaucracy; Continuity of Government; Credibility; Crisis Communications; Debt Crisis; Income Inequality and Labor Unrest.

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Buildings

As concerns about crisis management increase, owners and operators of buildings have increasingly begun to prepare thorough and systematic ways to respond to crises. Building owners and occupants have long been concerned with crisis management, creating the policies, procedures, and mechanisms to allow them to respond quickly and efficiently to disasters. While historically crisis management has focused primarily upon response to individual situations, recently emphasis has shifted to include mitigation, preparedness, and recovery as well. Although certain natural disasters affect only certain regions of the United States, these are coordinated through central federal agencies that also cooperate with state and local authorities. As a result of these efforts, buildings are better able to respond to a variety of disasters, both natural and human-made.

Background

Buildings can be any human-made structures that are used for occupancy, shelter, or other uses. For over 500,000 years, buildings have been created to provide shelter and other space for indoor work and play. In addition to shelter, buildings provide general living space, privacy, and storage and generally add to the level of comfort of those dwelling within them. Throughout the globe, buildings vary greatly based upon a wide variety of factors, including the availability of building materials, weather conditions, landforms, prices, specific uses, and aesthetic considerations. Historically, most threats were dealt with as they arose, causing a sometimes chaotic and inconsistent response that endangered the safety of both humans and property.

Crisis Management Plans

Builders, owners, and occupants of buildings work to develop plans to assist them in responding to emergencies and disasters. When a crisis strikes, the immediate safety of occupants of a building and a timely recovery often depend upon the existing level of preparedness among all involved. Crisis management plans involve three considerations:

- Protecting the safety of occupants of and visitors to the building
- Safeguarding the contents of the building, including capital equipment, records, and other physical resources stored in the building
- Coordinating with security and other personnel to ensure that an organization's emergency response and recovery procedures are followed

Well-written crisis management plans include procedures that are comprehensive, simple, and flexible and that can be applied to a variety of emergency incidents. These emergency incidents include both local difficulties and national disasters, both natural and human-created. Local emergencies might include such problems as anthrax scares, bodily injury, bomb threats, civil disorder, chemical spills, fires, odors, radiological accidents, snow and other storms, and utility outages. Major disasters covered by a crisis management plan might include earthquakes, floods, terrorist attacks, hurricanes, and tornadoes. At their essence, crisis management plans must focus on three areas: preparedness, responding, and recovering.

For a crisis management plan to be effective, it must be distributed to every building occupant. Before an emergency occurs, it is vital that the plan be known and understood by these individuals. Disseminating the crisis management plan must thus address all building occupants. The plan should be reviewed with all on an annual basis, and new personnel or occupants should be briefed upon hire or upon moving into the building. Multiple copies of the crisis management plan should be accessible in locations throughout the building and organization. Finally, members of the building Emergency Response Team should keep a copy of the crisis management plan at home, in the event an incident occurs when they are not in the building. These copies are best formatted

Case Studies: Two Notable Building Crises and Response

In 1871, the blaze that became known as the Great Chicago Fire destroyed over 3.3 square miles of buildings and killed hundreds of people. Although the origins of the fire are uncertain, it is known that it started in a small barn located on DeKoven Street. A drought prior to the fire, Chicago's reliance upon structures primarily made of wood, and strong winds from the southwest combined to create a situation that caused the fire to spread rapidly. City firefighters reacted slowly to the blaze, in part because of exhaustion from fighting another fire the day before. The inferno burned uncontrolled for two days before rain extinguished it, leaving over 100,000 people homeless. Conditions were exacerbated by the many wooden sidewalks present and by the destruction of the Chicago waterworks, which left the fire department helpless. The mayor declared a state of martial law, and Civil War general Philip Sheridan was placed in charge of relief efforts.

A little more than 35 years later, the 1906 San Francisco earthquake again demonstrated the catastrophic damage that could occur to buildings as a result of a natural disaster. Estimated to have had a magnitude of 7.9 on the Richter scale, the 1906 San Francisco earthquake left nearly three-quarters of San Francisco's 400,000-person population homeless. Although the earthquake itself was highly destructive, many of the buildings were destroyed by fires that started after the initial quake. Over 25,000 buildings on nearly 500 city blocks were destroyed, and the fire department was unable to fight these because the city's water mains had been destroyed. Riots and looting broke out in the aftermath of the disaster, and the U.S. Army was called in to restore order and to assist with the recovery process.

The response to disasters such as the Great Chicago Fire and the 1906 San Francisco earthquake was a revision of building codes to reduce the chances of a recurrence of these disasters. Delays in the reconstruction of San Francisco, however, caused the revised building codes to be made less stringent little more than a year after they were put into place. Plans were also made in Chicago to broaden streets in an attempt to make it easier to combat future fires. Secondary sources of water were secured in the event that water mains were destroyed by natural or human-made disasters. More importantly, builders began to consider how to make buildings that were more resistant to disasters, and city planners and others began to consider how best to respond to and manage crises that occurred.

in loose-leaf binders, prominently labeled on the binding, and stored where easily accessible in an emergency.

Certain emergency response guidelines are relatively simple. All occupants of a building must be prepared to take deliberate and appropriate action in the event of an emergency. For example, many crisis management plans suggest that all occupants know the location of at least two emergency exits in their area and that management keep flashlights accessible in those areas without natural lighting. In the event of an emergency, it is crucial that, before taking any action, occupants ensure they are not endangering themselves. Chemical spills, fires, electrical wires, radiation hazards, toxic fumes, unstable structures, and other hazards must be avoided. A call should be placed immediately to the appropriate fire, medical, or police agency, with the caller prepared to provide his or her name, location, and the nature of the emergency. Occupants must be prepared to remain calm, use common sense, and render assistance as necessary, including being willing and able to evacuate the building immediately at the request of the proper authorities or upon hearing an appropriate alarm.

Developers or owners of buildings can also take steps to reduce risk to occupants and to the building itself. Fire sprinkler systems, for example, can protect occupants and buildings from the risk of fire. Although created in 1812, historically fire sprinkler systems were only installed in buildings that were at high risk of catching fire, such as textile mills and large commercial buildings. In recent years, however, fire sprinkler systems have become much more cost effective and are now found in a variety of smaller commercial and residential buildings. In 1990, the U.S. Congress passed what is commonly known as the Hotel and Motel Fire and Safety Act of 1990, which mandated use of fire sprinkler systems in hotels, motels, meeting halls, or other buildings that are used by government visitors. Although many local building codes do not mandate the installation of fire sprinkler systems, developers who choose to install them often benefit from an array of advantages, including larger floor area limitations, longer egress pathways, and fewer requirements for the use of fire-rated materials. Developers and owners of buildings that include fire sprinkler systems often benefit from lower insurance rates as well. Active fire protection also mandates the availability of fire extinguishers, fire detection systems (such as smoke alarms), and other warning systems. Warning systems can automate the process by which fire, medical, and police services are contacted, thereby safeguarding building occupants as well as the building itself.

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See Also: Backup Strategy; Damage Assessment; Damage Containment; Preparedness; Prevention; Recovery.

Further Readings

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Bureau for Crisis Prevention and Recovery, UN (UNDP–BCPR)

The Bureau for Crisis Prevention and Recovery (BCPR) is a division of the United Nations' global development network under the United Nations Development Programme (UNDP). It was created in 2002 as a result of a UNDP Executive Board decision that recognized that "crisis prevention and disaster mitigation should be integral parts of sustainable human development strategies." Earlier, in 1998, the UN General Assembly had decided to "transfer to UNDP the responsibilities of the Emergency Relief Coordinator for operational activities for natural disaster mitigation, prevention and preparedness."

Mandate

The BCPR mandate is to enhance the UNDP's efforts for sustainable development and poverty reduction by working with partner governmental and nongovernmental organizations in order to enhance disaster risk management capabilities, reduce the incidence and impact of disasters and violent conflicts, and strengthen post-disaster governance to establish the solid foundations for peace and recovery from crisis. In a nutshell, the BCPR's goal is to transform the UNDP into a global leader on crisis prevention and recovery.

Specifically, the BCPR's role is to act primarily as a repository for crisis prevention, response and recovery knowledge, tools, methods, and experience that can be accessed and used by UNDP Country Offices, Regional Bureaus, and UN Headquarters whenever and wherever needed. The BCPR is not responsible for designing and implementing crisis programs on its own but provides technical knowledge and financial resources (through the Crisis Prevention and Recovery Thematic Trust Fund or from UNDP TRAC 1.1.3 core funds) to actors and agencies that are present on the ground in support of their crisis prevention, response, and recovery activities. It also has a key role in defining policy for interagency coordination in post-crisis transitions by functioning as a conduit between the humanitarian phase of a post-crisis response (led by UN agencies such as the Office for the Coordination of Humanitarian Affairs, UNICEF, and World Food Programme) and the long-term development phase following recovery (which is the UNDP's responsibility). The BCPR's disaster risk reduction work contributes to the International Strategy for Disaster Reduction (ISDR) and the implementation of the Hyogo Framework of Action (HFA), the international framework for disaster risk reduction. Finally, it advocates crisis sensitivity by working to ensure that the UNDP's long-term development policies and programs incorporate opportunities for disaster reduction and conflict prevention and that the UNDP's commitment to gender equality is reflected throughout these policies and programs.

New Strategy (2007–11, Extended to 2013)

At its conception, the BCPR's substantive activities were organized through seven technical service lines: conflict prevention and peace building; recovery; security sector reform and transitional justice; small arms reduction, disarmament, and demobilization; mine action; natural disaster reduction; and special initiatives for countries in transition. In the first five years of its operation, the bureau has tried to respond to all requests for assistance from UNDP country offices, only to find its human and financial capital stretched thin across a wide range of crisis issues in a variety of countries.

The resulting structure of strategic initiatives was found not to be well integrated, and in 2007 a new strategy was developed for the BCPR's work to focus mainly on (1) select countries based on the nature of the crisis they face and the BCPR's capacity and ability to make a difference through its intervention, and (2) specific prevention and recovery results articulated as "development outcomes" (actual changes in development conditions that UNDP interventions seek to achieve) supported by actions that draw on the bureau's expertise.

As a consequence of this strategy, in terms of prevention, the BCPR prioritizes countries of high vulnerability to natural hazards as evidenced by the UNDP's Disaster Risk Index and in situations facing conflict risk as identified by UN forums. Similarly, when it comes to recovery, the BCPR gives priority to situations where critical national or local capacities have been severely disrupted due to the scale of a natural disaster and situations of priority to the UN Security Council or the Peacebuilding Commission, or where UN engagement has been proposed by the secretary-general. Special attention is also given to those post-crisis countries that receive limited development assistance.

Under the two overarching outcome areas of prevention and recovery, the BCPR has identified nine specific development outcomes to which the UNDP contributes:

1. Prevention (crisis risk reduction):
    - » Development of a common awareness and understanding of crises among key stakeholders
    - » Management of crisis through inclusive dialogue, including traditionally marginalized stakeholders and actors such as women
    - » Strengthening national capacities, networks, and institutions to manage crisis risks

   - Preparation and implementation of crisis-sensitive development and recovery programs
2. Recovery (restoration of a foundation for development):
   - Stabilization of community and personal security situation
   - Inclusion of gender equality and women's empowerment provisions in peace agreements
   - Reestablishment of basic governance functions
   - Revival of sustainable economic activity through the restoration of basic capacities for support for livelihood creation at the community level and assistance in the protection and rehabilitation of productive assets and infrastructures
   - Nurturing of a cohesive social system through the establishment of effective transitional justice mechanisms and the adoption of conflict resolution approaches in the communities

This New Strategy reemphasizes the role of the BCPR as a "knowledge repository" in the field of crisis prevention, response, and recovery that will draw not only from its own work but also from the experiences of all actors throughout the UNDP and the UN system. In this context, the BCPR is developing a Learning Platform on Gender and Crisis Prevention and Recovery in coordination with leading international institutions, such as the London School of Economics and the New York Social Science Research Council. This facility will provide tools and resources to assess on a comparative basis gender and CPR issues at country, regional, and global levels and will facilitate collaboration on gender and CPR issues across the United Nations and with civil society, nongovernmental organizations (NGOs), universities, research institutions, and regional organizations. This platform will also provide training for UNDP staff and will offer space and support for staff think tanks, retreats, reflection, and writing.

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See Also: Coordination; Crisis, Definition of; Disaster Risk Reduction; International Strategy for Disaster Reduction, UN (UNISDR); Poverty; Preparedness; Prevention; Protection; Recovery; Response; Risk Assessment; Stakeholders.

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Bureaucracy

In strict technical usage, *bureaucracy* is a neutral term referring to the manner in which a complex governmental operation organizes itself, permitting nonelected officials to implement the will of a legislative or executive entity in an effective and efficient manner. In common usage, the term *bureaucracy* refers to an organizational scheme characterized by cumbersome processes and the ineffective and inefficient use of resources. There is a popular perception that excessive bureaucracy has contributed greatly to problems in crisis management, which are partly true and partly perceptual.

Model Bureaucracy

There have been complex government operations throughout history, including the administrative structures of the Roman, Egyptian, and Chinese empires of antiquity. Each of these empires required a means of organizing work over a wide geographic area where workers were separated from the central government, which limited or eliminated the potential for direct oversight. This created concerns that government operations throughout the empire would be handled in an inconsistent manner, creating potential service gaps or the overlap of functions and authorities. To address these concerns, these empires created some form of administrative structure to oversee operations throughout their areas of hegemony. The same has been true of other governments over the years, but the manner of that organization was not studied in an empirical manner until the early 20th century.

German sociologist Max Weber became interested in how complex organizations structured themselves to conduct work. Studying large-scale organizations, he identified a model form of bureaucracy that was both effective and efficient. The model was founded upon a politically neutral leadership possessed of technical proficiency, clearly defined lines of authority that minimized external influence on operations, a scheme for documenting and archiving records of operations, detailed rules that provided for internal consistency by organizational members, and a readily identifiable organizational hierarchy that eliminated overlapping or concurrent authorities and responsibilities.

Weber believed that bureaucratic organizations could be both effective and efficient, but were prey to shortcomings if the principal elements were not adhered to closely. Additionally, he suggested that while the system would be ideal in a stable environment, it was not designed to function well in an unstable environment. Based on Weber's work, this was not a shortcoming, given that bureaucracies were created to achieve the goals set for them by a legislative or executive entity, not to be entrepreneurial in seeking new roles, responsibilities, or authorities.

Modern academic works on bureaucracy suggest that, despite negative perceptions, bureaucracies are more effective and efficient than might be considered to be true by the masses. Such works note that modern bureaucracies often work within narrow legislative mandates that, in some instances, place oversight in the hands of managers selected for political reasons, as opposed to technical proficiencies, thereby violating a basic tenet of Weber's works. These works also suggest that, in some instances, the enabling legislation is so specific that the agency leadership and employees have few opportunities to deviate, regardless of circumstances. Despite this, many modern bureaucracies are as effective and efficient as they can be, within the operational and administrative parameters provided them by the legislative or executive entity that created them. These operational parameters often take the form of detailed rules for internal work processes, which provide for little deviation and limited discretion. As Weber noted, such internal rules may become so extensive that the organization becomes more concerned with following those rules than with achieving their stated goals.

Public Perception of Bureaucracy

In popular culture, the term *bureaucracy* is a pejorative. In common usage, it refers to large, unresponsive organizations, public or private, that are ineffective and inefficient. Bureaucracies are perceived to be entirely focused on internal operations instead of the needs of the public they serve, often treating the public in an impersonal manner. Their operations are viewed as ineffective or inefficient, often bound up in a highly arcane set of internal rules and forms known collectively as "red tape." In many ways, the public perceptions of bureaucracy are reflective of an organization that fell prey to the pitfalls of the bureaucratic structure identified by Weber in his works.

During a crisis, there is a commonly shared vision among the public, the media, and elected officials that public bureaucracies will respond in a wholly unified effort, focusing on the immediate needs of the disaster. Based on a number of factors, including how emergency management is depicted in popular films and books, there is an expectation that emergency management has full authority to acquire resources, make decisions, and work without legal constraint, if only they would demonstrate initiative. There is also a strong belief that the federal government has full authority over all incidents, which is not accurate based upon disaster policies in the United States. If problems do arise, they are often viewed as a lack of leadership, as opposed to being influenced by the legal parameters imposed upon public bureaucracies by the legislatures or executives that created them. These perceptions may contribute to the development of self-fulfilling prophecies that are inaccurate, though, in fact, there have been, and will continue to be, challenges to providing an effective crisis response based on the bureaucratic structures of the local, state, and federal governments.

Case Study: Bureaucracy Problems During Hurricane Katrina

During Hurricane Katrina, a number of problems ascribed to bureaucracies were noted. Illustrative of this, Louisiana's Governor Kathleen Blanco was accused of being nonresponsive for delaying requests for assistance to the Federal Emergency Management Agency (FEMA). In reality, she had requested assistance far earlier than reported, but she had asked for recovery aid, not response aid, and had not followed appropriate procedures for requesting assistance. Because she had not complied with FEMA's administrative requirements, assistance was delayed until the requests were submitted properly, though the need was clear and immediate. Similarly, FEMA had personnel standing by for response who were not permitted to respond without formal orders for deployment, which were not forthcoming, reportedly because President George W. Bush and Secretary Michael Chertoff of the Department of Homeland Security were unfamiliar with specific details of the National Response Plan. Based on internal rules, FEMA personnel who had been pre-deployed to areas near the crisis area were not permitted to proceed into the crisis area without specific orders, which slowed their response. FEMA was also criticized for requiring temporary workers and volunteers to undergo a multiday orientation that included materials on the Equal Employment Opportunity Act and the Occupational Safety and Health Administration, though the workers were needed immediately and most were working professionals with previous training in these areas. However, federal employment laws required federal employees, even temporary ones, to undergo such training, with no waivers for any unusual circumstances, including natural disasters, limiting FEMA's options to do otherwise.

These types of issues have been remedied in some degree by the development of the National Response Framework, which was tied to the Post-Katrina Emergency Management Reform Act, providing for greater flexibility on the part of the FEMA administrator, as well as for increased technical proficiency in its leadership. One frequently noted bureaucratic problem has been a lack of leadership. During Hurricane Katrina, Michael Brown, administrator of the Federal Emergency Management Agency, served as the Principal Federal Officer, responsible for coordinating the response of federal agencies in their support of state and local operations. After a number of problems were identified, Brown was replaced by Admiral Thad Allen of the U.S. Coast Guard. There have been mixed reports of Brown's efforts, but most have been negative, with many concerns tied to his reported lack of technical proficiencies in emergency management or coordinating large-scale, multiorganizational activities. Allen's efforts have often been lauded for their professionalism, based upon his efforts to engage all stakeholders through a unity of effort, as opposed to a unity of command. While working within the bureaucratic structure that existed, he was able to demonstrate strong servant leadership as he supported local and state agencies as well as nonprofit organizations through the use of federal resources. This was noted during post-disaster investigations, leading to a requirement that all future FEMA administrators have professional experience in emergency management.

Bureaucracy and Crisis Management

As a government function, emergency management in the United States is a role shared by local, state, tribal, and federal governments. There is no single agency or individual in charge. Based upon the precepts of federalism, each level of government is largely independent in terms of making its communities disaster resistant and disaster resilient, which is somewhat at odds with how emergency management is perceived by the populace, who believe that the federal government has a leading role and substantive authority in the area. This contributes to an environment where no clear hierarchy exists, where roles are ambiguous, and where rules are inconsistent, which are all reflective of types of problems associated with ineffective bureaucracies noted by Weber. The problem is exacerbated by the fact that there are over 80,000 governments in the United States, if one considers all forms of government, making the alignment of all efforts problematic.

In practical terms, this perceptual issue is exacerbated by the legal framework of emergency management. The basic U.S. disaster model, as framed in the Disaster Relief and Emergency Assistance Act (the Stafford Act), the National Response Framework, and the National Incident Management System, holds that disasters are primarily local events, with state and federal agencies coming in to provide assistance only if local resources have been overwhelmed, which must be clearly documented. This last requirement, as framed by the Stafford Act, is designed to ensure that no federal funds or resources are provided to local and state agencies unless absolutely necessary. In effect, the Stafford Act is a financial fraud prevention act, seeking to limit the distribution of federal funds to local and state agencies, as opposed to an emergency management response act, supportive of a flexible and rapid response to a crisis.

At Odds With Crisis Management

To some extent, bureaucracy and crisis management are at irreconcilable odds. Crisis management demands the ability of agencies to work in a flexible manner in a dynamic environment. However, regardless of how effective and efficient bureaucracies have the potential to be in a stable environment, if the idealized model is realized, they are not well suited for an unstable environment where the situation evolves rapidly. Despite this, the bureaucratic structures of local, state, tribal, and federal governments cannot be wholly eliminated during or after a disaster, for a host of reasons. There are potential means for addressing potential shortfalls. For example, the National Incident Management System provides guidelines to assist agencies at all levels of government to work together if a crisis occurs. Additionally, some research suggests that the adoption of contingent coordination, wherein agencies with overlapping or concurrent jurisdiction voluntarily yield operational authority to others for a temporary period, may help ameliorate interorganizational conflict. It might never be possible to create a bureaucratic structure that will be wholly responsive to the needs of a crisis, but it may be possible to develop organizational leaders capable of working within such an environment in an adaptive manner, contributing to more effective and efficient crisis management in future events.

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See Also: Agency Notification and Mobilization; Command and Control; Coordination; Disaster Declaration; Federal Emergency Management Agency (FEMA); Incident Response; Mutual Aid and Assistance; National Response Framework; Political and Organizational Leadership; Preparedness; Public Image; Scapegoating.

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Business Continuity Management

Business continuity management (BCM) is emergency planning for businesses; if implemented properly, it will help a business recover in the event of a disaster or disruption to its normal day-to-day operation, Some things fall outside the area of BCM; for example, if the disaster is so great that central government takes charge of the recovery, it could be some time before workers are allowed back into a business to start the business recovery process. Another example is if internal business functions fail to perform, for instance, if internal audit or risk or corporate governance fail to do their jobs of protecting the business. In such an event there is not a great deal that business continuity can do. There have been companies whose fall seemed to happen overnight, and the blame was put on one person or one event, but in the cold, hard light of day, common sense tells us that other failures must have been happening in the background to allow a small event to become catastrophic to the business. It should be remembered that no business unit stands alone when considering business continuity management planning.

The purpose of business continuity management is to keep key functions of any business operational during a disruption. BCM is made up of six segments, with project management as the center of the wheel; the point of identifying the processes as a wheel is to underscore the continuous nature of business continuity management.

The six areas of business continuity management are discussed below.

BCM Program Management

Like most new business processes, business continuity starts with program management. When implementing business continuity for the first time, as with any new project, normal project management considerations apply, such as identifying which sector of the business is affected, over what time scale, what are the project deliverables, and are there any "quick wins" (i.e., things that can be done quickly to show management a return on their investment and also that the project plan is on track). All projects need to have assigned responsibility; it may be to a steering group to give the project oversight and to decide what is within the scope of the project. Normally, information technology disaster recovery (ITDR) will be out of scope, as this should be a normal function of the IT department. Remember that all companies or business are political and office politics will play a part, so other managers should be involved as equals—a facilities manager didn't get to be the manager by not knowing the job, and business continuity management is all about teamwork, both in the setup stages of program management and in the stress-filled environment of a full invocation of a business continuity plan.

Understanding the Organization

It is necessary to understand the organization, all the processes, and how each department interlinks with each other in order to understand what the mission-critical activities of the business are. This is done by using a business impact analysis. This analysis asks each business unit or department key questions about how the department operates. These answers will be used later to help develop the business continuity strategy. As a business becomes larger and develops more services or products for its customers, its business departments or business units become more interlinked; sometimes these interdependences are unknown, and if there is a disruption to one of these departments, the effects could be catastrophic. The business impact analysis must therefore ask these questions: What does this department do? How does it do it? Where does the information/product go? Where does it come from? Are there any service level agreements (SLAs) or legal requirements? What are the resource requirements to kept this process going? And what are the time frames? These are just a few of the questions that the business impact analysis (BIA) will ask, thereby providing a process map of how the business works. Having this information will not only help with business continuity planning, as it will be known which departments have mission-critical activities and if there are any single points of failure. A single point of failure is a department, process, or even a person that, if unable to do its job, would stop the other normal processes of the business dead in their tracks. So when developing the business impact analysis, it is important to ask the right people. Senior managers are invariably asked what their department does and how it works; the really danger of this is that unless that manager was promoted from within that department, he/she may not know the specific processes that run that department and which ones need to be recovered—in short, ask the people with the knowledge, not just the ones who are in charge.

Determining BCM Strategy

The purpose of a business continuity strategy is to ensure the business can continue to deliver its products and services, providing mission critical activities with alternative resources within the needed time frames as laid out in a business unit's business impact analysis. The business strategy should cover staff, buildings, technology, and supplies and supply chain (if a manufacturing business).

Staff: The health and welfare of the staff should be at the top of the list. Staff are a key resource;, their knowledge of the business and processes and what their business's customers require makes them indispensable. Recovery teams and those staff working at the business continuity recovery sites will, in the first stages of a disruption, be working for goodwill toward the company. They may have to come to work early or leave late, and the recovery site could be miles away from their normal place of business, thereby adding hours to their working day. With this in mind, ensuring that staff payroll is at or near the top of any recovery list will go a long way toward ensuring that the goodwill the staff have at the start of the incident will still be there at the end.

Buildings/technology: Dealing with a denial of access or loss of a site is one of the key strategies that should be at the heart of any business continuity plan—how business function will be maintained if access to the business or its main site is unavailable. The recovery plans must include measures to deal with this event. If there is no access to the building but the building is still there, it will be known at some point, depending on the nature of the event, when access and business function will be able to recommence normal operation. The BCM strategy may be to send staff home for the day, as a full invocation of the business continuity plan may cause more disruption than the event itself.

If, however, there is a total loss of site, the business continuity plan will be invoked and may run for many weeks. There are key industries in which this type of event causes major problems to recovery planning; these are business that need clean rooms, such as food manufacturers, technology companies, and drug companies, all of which use clean rooms in their product manufacturing processing and all of which are very difficult to find in recovery sites that are not built with the company in mind. Technology covers many areas, such as office computers, laptops, or servers, or telecommunications that a business needs to talk to its customers, stakeholders, or even staff at other sites to ensure that the recovery process is not delayed. Specialist technology may be needed for the business processes, and what would happen if this technology were lost and what mitigation could be done to soften the effects of its loss should be considered.

Supplies and supply chains: It is the nature of world trade that there may be components in the manufacturing process that come from all over the world. What would be the effect if this supply chain were to be disrupted by natural disaster? What if materials cannot make it to the factory in time for a "just-in-time" supply chain? Is there a stockpile of core components just in case there is a disruption, or a list of other local suppliers who could step in if needed? It may be necessary in a disruption to acquire components locally at higher cost to ensure that there is as little disruption to the customer base as possible. This cost can be recovered if it is included as part of the disruption insurance.

Developing and Implementing a Response

There needs to be a process in place for the invocation of the company's business continuity plan; this is normally done by the incident management or crisis management team. They are a group of senior managers whose role in a disruption is to manage the incident and the work of the recovery or business continuity teams. There tend to be three levels of incident management, which reflect the same structure as the emergency services. While the emergency services use "gold," "silver," and “bronze” to label their command structures, in business continuity, “strategic,” “tactical,” and “operational” are used. At the strategic level are board members, who have to make strategic decisions on how a disruption is to be handled; at the tactical level are senior managers, whose role is to manage the recovery of the business and report to the board but who also set the goals of the operational teams; and finally are the operational teams, whose job it is to fix or manage the disruption. These are also the business continuity recovery teams who will be at the work area recovery (WAR) sites, running the mission-crucial activities until the disruption has been dealt with or until most if not all the key activities are being run from the recovery site. When a business continuity response has been developed for processes, it should be asked if the cost of the response is more than the cost of running the processes. If the recovery cost is more than would made from the process, it must be asked, “Is the recovery doing more harm financially than if the process weren’t recovered?”

Exercising, Maintaining, and Reviewing

Any business continuity plan that is not tested is an unknown and more than likely will fail, because if it is not tested, any weakness within it will not come to light until it is too late, and staff and key managers will not be certain of its implementation. Because of the ever-changing nature of business, it is important to annually, if not more frequently, review the business continuity plan to ensure that it is up to date and reflects the business or department it is designed to recover.

Embedding in the Organization’s Culture

If an organization has a business continuity plan but none of its staff know what it is or their role within the plan, the chances of its working are low, to say the least. Staff should be told not only what the business continuity plan is but also what their specific role is within the plan. This can be done in many ways, such as an internal company newsletter or magazine, a monthly update on business continuity, or by having a business continuity awareness week. Staff could be e-mailed and informed of any new business continuity roles within the company, or there could be town hall–style meetings with staff to inform them what business continuity is all about. There are many ways to inform staff—companies just need to find what works for them and then do it.

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See Also: Business Continuity Planning; Business Impact Analysis; Business Resumption Planning; Critical Business Functions; Strategic Plans.

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Business Continuity Planning

In today’s world, almost all companies have some level of planning that addresses their awareness of the possibility for events to occur that will cause a disruption in their operations. This has become known as “business continuity planning” and typically focuses on the infrastructure needs of an organization. Companies spend a great deal of time ensuring that all of their equipment will be able to function following a critical event; however, very little time has been focused on planning for the people who would be managing that equipment—that is the human component of business continuity and is the key to any successful plan.

Multiple factors need to be taken into consideration when planning for the human component and whether or not someone will be able to work following a crisis. These factors can be identified either as having a physical impact on individuals’ ability to work or as having a psychological or physiological impact on individuals that interferes with their being able to work to their pre-crisis level. In order to explain how these factors can impact an individual, this article uses a case study of a hospitality organization with properties in the city of New Orleans and the impact that Hurricane Katrina had on its employees. Critical lessons were learned as a result of Hurricane Katrina at all levels, including individual, organizational, and local and federal government.

Although there was capability to provide advance notice that Hurricane Katrina would make landfall on the Gulf of Mexico shoreline, few were prepared for the devastation that occurred as a result of the breaches in the levee system surrounding the city of New Orleans. Businesses in the immediate vicinity were able to survive the initial effects of the storm coming onshore; however, the failure of the levee system with its resulting flooding was insurmountable for most.

Physical Impacts

With Hurricane Katrina threatening to potentially be one of the most destructive hurricanes in the history of the United States, New Orleans mayor Ray Nagin called for a voluntary evacuation of the city at 5:00 P.M. on August 27, 2005, and subsequently ordered a citywide mandatory evacuation at 9:30 A.M. on August 28. The evacuation ordered by the mayor was not mandatory for hotels in the area.

On August 29, the center of Hurricane Katrina passed southeast of the city of New Orleans. Initially, hotels in the area reported flooding on lower levels of their properties due to the storm surge. Reports from the properties indicated that they were able to relocate guests and supporting facilities to higher floors. Employees who were at work when the storm hit were unable to leave when their shift ended. Staff who were scheduled for subsequent shifts reported a lack of transportation and inaccessibility that limited their ability to report to work. Many of the major roads suffered some damage. As a result, the employees at the hotel were enlisted to stay on extended shifts to ensure the safety of the guests and provide amenities as available.

Because hotels were still able to provide shelter to the guests who had remained at the properties, they began reporting the need to address security issues that were developing. Several properties reported people other than guests attempting to enter the premises. Staff were instructed to lock down the properties and to place sheets over the windows to keep them from being visible to people outside on the streets. Staff also reported that local government agencies were exercising their right of eminent domain and inserting their operations into the hotel properties.

Communication is a critical component during an emergency situation. During Hurricane Katrina, the infrastructure supporting telecommunications was compromised. Cell phone towers were inoperable, and land lines were minimally functioning. Lack of means of communication resulted in increased difficulty in accounting for guest and staff status and location. The hotels utilized an emergency call center located outside the affected state as a central communication link for all properties along with their headquarters operations. This link was crucial in identifying those guests and staff who were unaccountable for and was able to place outgoing calls to contact numbers that had been documented prior to the incident. It also provided a connection between the hotel's emergency response team located at their headquarters and all of the properties that were impacted. Updates on the status of the properties and the events unfolding in the city as well as the emergency response were able to be processed via this two-way communication link.

As the flooding from the breached levee system increased, evacuation became imperative for safety. Buses and trucks were brought in to move people quickly out of the affected areas. Because of the critical nature of the situation, people boarding these transports were not always aware of their final destination. Staff from the hotels were widely scattered throughout the United States and, as a result, a number of concerns developed. First priority was assessing the status and location of their staff and connecting them with their family members. The hotels utilized a variety of means to contact their staff and their family members. They sent notices to the various support centers providing the emergency contact numbers for their company. They used radio and newspaper announcements to distribute the emergency call center number. Once the hotels were able to account for all of their staff, coordinating logistical support was next. Because many of the staff were no longer in the state of

Louisiana, identifying who could report for work and whether they could work at other properties, how to pay the staff, and how to access banking accounts and medical benefits quickly became the focus for management.

Psychological Impacts

When explaining the psychological responses of individuals during a crisis situation, most studies utilize Abraham Maslow's hierarchy of needs theory, which was first introduced in a paper by Maslow in 1943. This theory identifies four levels of basic human needs and suggests that the basic levels need to be met prior to an individual being able to focus on attaining the fifth and highest level. Many of these levels can occur at any given time, although there is some requirement to have the base levels fairly well met prior to an individual being able to focus any energy toward attainment of the higher levels.

During a crisis, the very base level—which includes those staples that sustain human life—is the immediate necessity. Food, water, air, sleep, and physiological homeostasis make up this foundation. Initially after Hurricane Katrina making landfall, these items were available at the hotel properties. However, the next level—which focuses on issues connected to safety of the individual, property, and family—was compromised. The staff reported witnessing looting, violence, buildings burning, and the sound of gunshots just outside the hotels. With the majority of the attention of the authorities focused on the rescue efforts, their sense of safety as well as the inability to contact family members and assess their safety became cause for concern.

In this situation, the insertion of police personnel into the properties provided the protection necessary to achieve a sense of personal safety for guests and staff. Staff later reported that the sharing of their resources with the police personnel provided them with a sense of connection. This connection, along with the contact with management at headquarters, was critical in their ability to keep from being overwhelmed by their circumstances. Staff also reported that their initial sense of helplessness with regard to the crisis diminished as they were able to provide basic amenities such as food, shelter, and safety to the guests as well as to the police.

Response

In addition to understanding how Maslow's hierarchy of needs theory is manifested by people in crisis, current disaster response literature also includes the concepts of vulnerability and resilience with regard to the individual's ability to cope with a disaster. There appears to be some relationship between vulnerability and resilience; however, additional research is indicated to further identify the connection. Some of the most vulnerable communities have been able to exhibit significant resiliency following disasters, including the city of New Orleans.

Resiliency is connected to the ability of an individual or a community to recover from a disaster and is a direct reflection of the level of planning and preparedness that happens prior to the occurrence of a disaster. This planning and preparedness needs to be addressed on the personal level as well as the organizational/community level. Developing the emergency response plan is one of the first steps in emergency response preparedness, but it is only the first step. Testing the plan will help identify whether it is operational for the organization and whether it has any shortcomings. It has been evidenced, however, that even with planning and preparation at all levels, another factor, adaptability, plays a significant role in survival following a disaster.

Flexibility is a critical factor during a crisis and results in being able to adapt to situations as they arise. Crises vary from hour to hour as the events develop, and the impact experienced by those affected will also tend to vary. The organization and its staff need to be able to recognize the changes needed in order to support the response. However, due to the physiological and psychological impacts of stress, people may have a difficult time learning new behavior in the middle of a crisis. Requesting someone to complete a task that is outside his or her usual routine will require more information and guidance than usual.

The duration of the crisis and the level of destruction definitely impact the resiliency of an individual or a community. Because of the massive level of destruction of property along with the significant number of deaths that resulted from Hurricane Katrina, the negative impact on the resiliency of the community and of individuals was devastating.

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Army National Guard members help New Orleans citizens into evacuation buses after being stranded for three nights at the Hyatt Regency Hotel downtown after Hurricane Katrina, September 3, 2005. Local hotels experienced severe disruption, not only to their infrastructures but also to the human component of their businesses, which is needed to keep a business continuity plan running. Staff were unable to come to work or were evacuated to unknown destinations, communication was compromised, and security issues developed.

Physiological Factors

The effect of stress on the human body is another component for discussion and education when addressing the human component of business continuity. At the time of a crisis, being able to provide people with information about the body's response to stress can normalize their experiences and have a calming effect. Even in major disasters, this information can help people regain some control over their responses in an out-of-control situation. However, very few organizations consider how a crisis may affect the ability of the staff to fulfill critical roles at the time of a disaster. In the case of the hotel management being disconnected from their staff at the properties during Hurricane Katrina, having some information on the impact of stress on their staff helped them to support their staff appropriately so that they could handle the challenges they faced.

When a crisis occurs, a number of natural and normal internal processes are put into motion. Numerous articles and studies have addressed the acute stress response first described by Walter Bradford Cannon in 1932. Otherwise known as the "fight-or-flight response," his theory explains how the physiology of animals, including humans, responds to a perceived threat. The main focus of this theory is on the sympathetic nervous system. This system plays the primary role of regulating the homeostasis of the organism. It accomplishes this by direct connection to almost every organ system in the body. Additional research has identified a "freeze" component to the response that is exhibited just prior to the reaction to the threat. By understanding this and being able to provide information on this natural response, an organization can help reassure staff that their responses are very normal given the very abnormal circumstances. Also, this normalization for the experienced responses can help assuage the guilt, blame, and anger that may result from misperceiving the actions of others.

In addition to the acute stress response, knowing that people can be present but not fully functioning because of fear, concern for family, and exhaustion is especially helpful when communicating information. The ability to concentrate is taxed during a crisis and results in the need to repeat information and to inquire about any questions with regard to the information being communicated. Organizations can plan for this interference by developing documents to be utilized during a crisis that cue the user for specific information and questions. Information sharing is additionally challenged by all of the false information or rumors that may be shared during a crisis. Bringing these rumors to the surface for discussion is an important piece of the communication between staff and management.

Recovery

On September 5, 2005, almost one week after Hurricane Katrina made landfall, all properties reported that all guests and staff had been evacuated. However, efforts continued to be necessary to account for their staff as well as their status and locations. Once the primary needs for survival and safety were met and families were reunited, management was able to shift its focus to logistical concerns regarding identifying locations for staff that were available for work, paychecks, and benefits, along with ongoing communication in general.

Part of the recovery process following Hurricane Katrina included continued monitoring of the health of the staff and management. Initial debriefings provided a means for people to share their experiences and gain some understanding of the overall response, especially at the staff level. Additional meetings that focused on the organization's emergency response teams and management provided support as well as time to discuss areas of concern. These teams often reported a greater sense of responsibility and frustration at the time of the crisis due to the fact that the teams were the liaison between the organization and the events going on at ground level.

Lessons Learned

Following a crisis that has had a significant impact on an organization, an after-action review of the plan and the processes in light of the issues that surfaced during the response is considered to be a best practice in emergency management. Identifying areas where additional definition and focus are needed as well as integrating information from the response increases the value and integrity of the plan. Numerous changes in operational processes resulted following the aftermath of Hurricane Katrina with regard to business continuity that took into account the human component. Changes occurred at all levels within the organization and also on an individual basis.

On the organizational level, evacuation and shelter-in-place protocols were reviewed and internal decision-making processes were updated. One of the most problematic issues that surfaced during Hurricane Katrina was the inability of management to communicate with their staff and assess their status, locations, and any needs that were identified. The ability to connect with staff is the critical piece of the human component of business continuity. Knowing who is available for work and providing details about alternative worksites and accessibility of those properties in the affected area helps restore the operations of the organization. Updating personal and emergency contact information on an annual basis at minimum is crucial for effectively maintaining connection with staff.

Inclusion of other organizational departments, such as human resources, security, risk management, and information technology (IT), in addressing the human component of business continuity ensures that the impact of future crises is mitigated.

One significant obstacle reported during Hurricane Katrina was the difficulty in receiving paychecks and/or accessing banking accounts. Organizations can educate their staff on the benefits of having paychecks directly deposited into their banking accounts and making their funds available from other locations. Another difficulty reported was the inability to access medical treatment within their insurance network. Many of the staff were relocated outside the state of Louisiana, which placed them in an out-of-network situation with regard to their health benefits.

Knowing that this is a possibility during a crisis and having discussions with the health care providers regarding a backup plan for prescriptions and medical treatment is another aspect of preparedness planning.

Part of the organizational planning should include increasing the awareness of staff of the importance of developing personal emergency response plans. After Hurricane Katrina, the government authorities made strong recommendations for all individuals and families to create their own emergency response plans. Recommendations on components for a personal emergency response plan include disaster supplies, an evacuation plan with a predetermined point of assembly, and a communication plan to assess the status of all family members. The inclusion of the human component into the business continuity planning will result in a robust and functional emergency response plan.

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See Also: Debriefing; Department of Homeland Security (DHS); Disaster Recovery; Early Warning Systems; Emergency Alert Systems; Emergency Management System; Emergency Responders; Incident Management; Incidents Versus Crises; Response; Strategic Plans.

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Business Continuity Planning Life Cycle

The business continuity planning life cycle (BCPL) is used to implement and maintain processes that ensure the continuity of business functions. The BCPL is a process that consists of phases named analysis, design, implementation, testing, and maintenance. Using this process, the BCPL can provide contingency processes for various parts of the organization to use under crisis conditions such as a power outage or immediately after a fire or flood, anything that would interrupt the normal flow of activities in part or in whole. In short, the crisis management process would use the results of the BCPL to help an organization operate under crisis conditions.

The BCPL Process

The BCPL process is to analyze the flow of activities to determine if there are points in the flow at which something may interrupt or degrade that flow. At times, no analysis is needed because an adverse condition presents itself and the response is used to develop plans to handle the adverse condition in the future. Without an adverse condition, the analysis carefully reviews the flow of activities, looking for people, devices, or other resources that are single points of failure (SPOF) or a point in the flow where an interruption cannot be handled by existing processes. For example, an SPOF is a single fax machine that is required to complete the flow of activities. Should that fax machine break and there be no alternative processes, activities would come to a halt. In addition to the SPOF, there are levels of degradation in activities that present a problem for the organization in that it cannot meet deadlines.

Analysis Phase

Business impact analysis (BIA) is a more formal name for the BCPL analysis phase. The BIA is an interview and survey process that discovers which activities are most important to the organization. The BIA prioritizes the activities and gathers information on how much the organization would suffer if the activities could no longer be performed. The suffering is usually quantified in terms of loss, such as lost revenue and additional cost, but can include other measures of suffering. The final BIA summarizes the prioritized activities and potential losses for decision makers within the organization to review, modify, and approve with a spending threshold–based potential loss. This yields the next phase of the

Case Study: Client Support Planning

A company that hosts computer software for clients with 24/7 operations reduced costs by not having its systems engineering staff of six at the workplace 24/7 to provide support should the software break down and result in client support calls. Because the hosted applications deal with the life safety of patients, on several occasions a client had to initiate its crisis management processes to deal with the outages. Instead, the company placed engineers on call for client support; the engineer would be notified of the call by the 24/7 help desk. The on-call person would have a cell phone and laptop computer to provide support. Other engineers had no company-provided equipment to take home.

Issues arose when the on-call engineer was interrupted in the ability to support client calls by becoming ill or experiencing a family emergency that tended to override the engineer's ability to support the client calls. The on-call engineer would call for backup, but the backup engineer would need to go to the workplace to provide support because the disabled on-call engineer could not pass on the cell phone and laptop. Issues also developed when multiple failures occurred, forcing clients to wait while the single on-call engineer moved from one problem to another. In most cases it was faster to let one client wait rather than call an additional engineer to travel to the workplace to lend additional assistance.

To attract more business, the company instituted service level agreements (SLAs) with new and existing clients. These SLAs had monetary penalties averaging $1,000 for each hour the company failed to meet the SLAs. The penalties could multiply quickly if multiple clients experienced outages at the same time. This change increased the visibility of the engineering support problems and initiated the need for a better support structure.

The BCPL was initiated to analyze and address the addition of SLAs to the support function as well as various other functions related to the prevention of outages, such as software and hardware upgrades. This case study concentrates on the engineering support function.

During the analysis it was discovered that the average monthly on-call support was 24 hours and involved 12 clients and just four systems. There were four cases of multiple problems happening at the same time, so one client had to wait until the on-call engineer finished correcting one problem and could move to another; this delay was 0.5 hours. The average individual client outage was 0.5 hours, with some as long as four hours.

Considering the impact of SLAs, it was determined that an average long outage would cost $4,000, the average outage was $500, and the minimal total monthly cost would be $24,000. The financial department was consulted to determine an acceptable level of cost, since outages can be reduced but are unavoidable, and the acceptable cost was $3,000 per month; a spending threshold of $10,000 was approved, as well as $1,000 in monthly recurring expenses.

The engineering staff thought they could reduce the overall outages from 24 hours to 12 hours using different methods to prevent outages, leaving the 12-hour unavoidable outage at a cost of $12,000. Subtracting the acceptable $3,000 cost left a $9,000 probable monthly cost in SLA penalties.

The engineering team was consulted to understand the current process and to determine how the outages could be further limited and the estimated SLA penalty costs reduced while keeping within the $10,000 spent and the $1,000 recurring cost. The analysis and design and implementation phases of the BCPL happened at the same time in this case because the solutions were relatively simple to identify and implement.

Several requirements were identified, including the need to react more quickly to problem calls and to avoid client wait time for multiple concurrent problems, and the ability to more quickly fix the most common problems. Considered the biggest risk, the team obtained three on-call cell phones and three on-call laptops for $5,500 to be used by the six engineers on a rotating schedule so there would always be at least two engineers a phone call away. In order to respond more quickly to problems, it was determined that a software product could be purchased for $2,000 and $100 per month licensing fees that would test the server for a heartbeat, and if the server did not have a heartbeat, the software would send a text message to all on-call cell phones and an e-mail to the help desk. Heartbeat software investigates a server using several different methods, and if none of the methods works, the server is probably having problems. This heartbeat check is estimated to subtract on average 15 minutes from each call, as it takes between 5 and 15 minutes for the user to realize he/she is having an outage and initiate the call to the help desk. The analysis also identified that 40 percent of the issues reported had to be fixed by rebooting a server that usually hadn't been rebooted in more than a month, so the servers were programmed to automatically reboot themselves on a monthly basis. The clients agreed to this average 15-minute outage and agreed it would not count toward the SLAs because it was a planned outage.

Once all the equipment and software was purchased, the engineers did some testing to ensure each process worked as designed. As client problem calls arrived at the help desk, the on-call engineers were either already working on the problem or ready to work on the problem. The processes worked well for months, reducing the overall averages for outages to four hours affecting five clients and three systems. In some cases the heartbeat software notified engineers in time to have the problem fixed by the time the user called the help desk.

As time went on there were instances of weather so severe that the engineers could not safely travel to work. Adding to the problems, many times the severe weather would affect the servers, requiring quick response from engineers who could not make it to work. While the on-call engineers could handle the problems, the delays due to the reduced staff ran into as much as $35,000 in SLA penalties.

The BCPL was initiated again. The analysis phase was short, as the SLA penalties made it obvious that each engineer must have the capability to work from anywhere there is an Internet connection and that the company needed on-call support from contract systems engineers for larger outages. The decision was made to provide every engineer with a laptop and a cell phone and also to contract with a consulting firm for additional on-call help to be contacted when needed and to be paid by the hour. During large upgrades, an engineer would remain on-site off shift to be ready to handle client calls and call for support if needed.

In addition, some of the minor problems were so simply fixed that some instructions were given to the help desk to fix, allowing engineers to work on more complex problems and providing a career path from help desk to engineering. Last reports showed that the problems were reduced to two hours affecting three clients and three systems. Several severe weather events occurred with no noticeable degradation in service or increase in SLA penalties.

In order to maintain the efficacy of the work-from-home strategy, the engineers on call work from home the entire scheduled on-call duration and find it a job perk.

Case Study Analysis

This case study shows two forms of continuity strategies. The most apparent strategy was the BCPL development of a robust work-from-anywhere process for the systems engineers, the testing of the processes, and the successful maintenance processes enhancing the work-from-anywhere processes for all engineers. The second continuity strategy was instituting SLAs. Without the SLA penalties, the company would have had little impetus to improve its call handling processes and would have continued to have issues handling the outages in a manner acceptable to its clients.

BCPL potential interruptions to design for and a spending threshold that cannot exceed a certain percentage of loss.

Design Phase

The BCPL design phase takes all the analysis information and develops an iterative process of designing solutions to the potential interruptions that fit within the spending threshold. As solutions are determined, the options are validated by the people performing the activities and brought to decision makers for review and approval. After final approval, the designs are taken to the next BCPL phase, implementation.

Implementation, Maintenance, and Testing

The BCPL implementation phase schedules activities that implement the design. In some cases this can be a complex process requiring a project manager, purchase of equipment, moving of departments, and perhaps even some short, approved interruptions to the activities to realize the final implementation. After the BCPL implementation, there is a maintenance phase of acceptance and periodic testing.

The BCPL acceptance should be smooth if the implementation went according to plan, but there can be difficult implementations that require a return to portions of the design phase to modify the final solution. Once the final solution is firmly in place, it is tested and accepted if all goes well. The BCPL solution is maintained through testing. It is always advisable to test things that are infrequently used to ensure they will work as designed when they are actually needed. Testing can happen on strictly a periodic basis such as twice a year, or it can be triggered by changes in the activities the solution was designed for. The best way to test a BCPL solution is to test it after a significant change to the activities the solution was designed for. Testing should exercise all aspects of the BCPL solution and formally document the results. This way the new activities can be worked back into the solution by returning to phase one of the BCPL. Because the BCPL solution is infrequently used, the testing usually uncovers some part of the solution that does not work as well as expected and requires a return to phase one of the BCPL.

The contingency processes resulting from the BCPL can be invoked from the crisis management processes. When a crisis occurs, often there are outages of business processes that would be mitigated by the results of the BCPL.

Conclusion

Contingencies developed using the BCPL can be used by the crisis management process to overcome outages and interruptions for clients who care for patients and for every organization. The case study shows that the crisis management process would invoke the work-from-anywhere processes to help support clients.

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See Also: Backup Media; Backup Strategy; Business Continuity Planning; Critical Business Functions; Data Recovery; Dedicated Site.

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Business Impact Analysis

The business impact analysis (BIA) is a core component of any business continuity plan, or business continuity management system. The business impact analysis does exactly what it says: it assesses the impact to a business during a disruption, whether it is a denial of access due to loss of buildings or being unable to enter premises; loss of key systems, due to loss of information technology (IT), telecommunications, or Internet connection; or loss of key personnel, such as board members or key members of staff.

The business impact analysis describes how a business actually works, not how it is assumed to work. It analyzes how processes come into a department from upstream and what happens to those processes in this department to enable them to move downstream. It is effectively a process mapping of a business from a risk and disruption point of view.

Although there are many different types of business impact analyses (some in Word documents, some in Excel spreadsheets, some in specialized business continuity software), they all ask fundamentally the same questions: What is the role of a given department within the business? How does the department operate? Where does the information required to perform these processes come from? Were does that information go? Are there any service level agreements (SLAs) in place within the business, or with suppliers or customers? Are there any financial or legal impacts to the business if these processes are delayed? How much financial loss does that incur on the business?

A BIA is completed at the start of any business continuity management system to ascertain exactly how a business functions, and there is little point in doing business continuity planning without having the fundamental building blocks in place: how a business works, how departments interlink with each other, etc. A business impact analysis accesses this, enabling a business continuity plan to be produced that will work. The BIA also identifies single points of failure; these are processes or a department that on their own do not stand out as key, but if they were to no longer function, the knock-on effect to the business would be disastrous.

Having considered why a business impact analysis should be completed, now consider how the BIA is produced. It should be remembered that this is only a guide, as each industry has unique processes or departments, obvious examples being nuclear power or medical research companies that may have departments with very specific features and therefore require adaptations to the normal BIA template. Because businesses are complex, it is important to get the right information. This can be done by holding a series of interviews; it is, however, key to the success of the business impact analysis to make sure the right people are interviewed. For example, it may be necessary to interview the director of a department to get the strategic overview of the department, then the manager to get the operational point of view, and then the agent or person who is performing the process. They will describe what happens and what is needed to make the processes successful and where it goes when it leaves the department. They will also know any shortcuts to the process and what information is needed from other departments; in each department there is always one person who knows the processes and the department thoroughly, and this is the person ideally to interview.

The completed business impact analysis covers the following areas:

Information: This section of the business impact analysis lists what department it covers, what processes it operates, who was interviewed, and when. The reason for this is both to have an audit point on the BIA against which all others will be checked, and the name of the person interviewed so that if a problem arises, it is possible to go back and reinterview the original source of the information. It is true that most managers will delegate this task to one of their employees. At the end of the interview, a department business impact analysis should be completed and signed off by the manager; again this is part of the audit trail. Be aware that all businesses are political, even if they think they are not, so each manager will emphasize how important his/her department is; it may be necessary to allay any fears they may have in order to get to the right information.

Business activities: This lists the departments, business activities, and processes in the order of priority in which the department places them. It should also list the frequency of each process or activity: Is it a daily weekly or monthly process? What type of process is it—support, operations, legal? What is the recovery time for each process—five minutes to one month? Include any notes about a process, thus giving a snapshot of the department.

Financial: This looks at the direct losses for revenue and operations for the department over a set time period, from one hour to 10 days, and also indirect losses. These could be delayed production or a service level agreement or even cover the cost of dealing with the backlog of work that has developed because of the disruption.

Nonfinancial: This covers the effect of the disruption on company image, human resources, and regulatory or legal issues. Compliance can be added to this list, but the point is to look at the severity of impact over 1–10 days and at the level of impact from none to low, medium, or high. It is important to ask these questions because some disruptions that have had a negative effect on a business had no impact on its financial operations at first but had a very negative effect on the business in the days following the disruption.

Risk: Each department needs to look at risk—not financial risks but threats that may be of concern to the department. These threats can be listed, with likelihood and potential impact and maybe any notes. Threats range from power outage to natural disaster to fraud to terrorism; the severity can be graded from 1 to 5 or 1 to 10 for the impact and also for the likelihood. This is done for each department throughtout the business, and at the end of the process, a threat matrix for all the departments is completed. The threat with the highest number is one that will have the most impact; it, however, is also the one that is least likely. This information will drive the company's risk management strategies, and it is worth noting that any risk assessment would have to look at the environment in which the business was located; for example, petrol stations near the business would present a risk of fire and explosions. This would form part of the executive summary of the BIA report.

People: It is important when talking about how many people are needed to keep a process going during an event to remember that this is not always the same number that are needed during normal business operations. A department may have 25 staff working on a process, but in an event they may be able to get by with two for a limited time. So it should be asked how many perform processes during normal business operations, then how many are needed during an event to kept the most important process going, then how many extra people will be needed over a 10-day period. Each day that goes by that the department is not fully working means a backlog will accrue.

Alternative working/manual working: When asking about alternative working, caution should be taken to consider who is being asked, because as a manager moves around a business or up the management ladder, he/she will remember a time when a given process could be done manually. But as technology evolves in business, processes that were once fully manual may now involve some form of automation. With this in mind, it should be asked: Can this process be performed at another site? If so, is that site able to do this process? And what will be needed, that is, PC/laptops, Internet? Are there any vital records or templates that may be needed? Are procedures for doing this process manually available? Is it documented? And, most important, are the staff trained in these procedures?

Dependencies: Departments within a business do not run in isolation from each other; they all pass information or interact on a process. This process may come from upstream and through a department to be passed downstream. The reason these interdependencies are mapped is to determine the effect that having a department nonoperational will have on the business. Will one department that is not seen to be that important be critical to the key process of the business? Mapping out the interdependencies develops an understanding of the relationships between all departments and also highlights potential points of failure. A single point of failure is a process or department that would bring the business to a standstill if it were unable to operate normally,

Recovery time objectives: Recovery time objectives (RTO) apply to computer applications, telephony systems, or any automated system. It must be ascertained which systems a department uses, whether it is e-mail, Internet, or any other in-house software that is required to run or manage a process and whether, over a time frame of 1–10 days, the loss of this system would be manageable, disruptive, critical, or catastrophic. This information indicates the gap (if any) between what the business needs and what IT can deliver, and over what time periods (remember, IT is there to support the business, not the other way round).

Recovery point objective: Recovery point objective (RPO) is the point from which data need to be recovered following a disruption to the department. The department must determine what level of data loss, if any, it can handle once IT systems are back up and running. Can the department cope with data restored from the start of the working day or when the event happened? How much data can a department afford to lose?

Office: This section of the BIA specifies what the department would need to set up and run from another building or recovery area; for an example, over a time frame of 1–10 days, how many PCs, chairs, desks, and phones would the department need on day one just after the disruption through day 10, when a large number of processes should be recovered. Some departments will only have a fraction of their normal needs because their staff will have other roles during the disruption. Facilities management and the IT department may have most of their staff at the scene of the disruption trying to fix the problems and hence won't need that much office space at the recovery site.

Vital records: These are records that the business or department needs; they could be templates or contracts, so it is vital to know where they are. Are they on a system or server? If so, which one? This information is needed so IT can make it part of their disaster recovery plan and be able to back this information up in order to have copies at a recovery site, and if a department process needs this, it needs to be easily located.

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See Also: Business Continuity Management; Business Continuity Planning Life Cycle; Business Resumption Planning; Critical Business Functions.

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Business Resumption Planning

From the inception of the concept of business resumption planning, there has been much confusion over what is meant by the term. Many confuse it with business continuity planning; compounding this problem are business resumption planning templates on the Internet that, apart from the title, are in fact business continuity planning templates. The two are not the same, and confusion is only increased when the term *return to normal service planning* is introduced. It is little wonder that there is so much confusion surrounding the jargon. Business resumption planning is the planning required to return a business or organization from the state of having had an incident—during which a business continuity management was implemented—to a state of normal business.

In the linear process of business continuity, first there is risk management, which is identifying, classifying, and, where possible, mitigating risk to a business. Second, there is incident management, which is dealing with the incident, activating continuity plans, bringing in key personnel, and dealing with the initial effects of the incident. The role of a business continuity plan is to maintain key core processes and services, both internally and externally, to key customers at an agreed service level. This service level will be, by its very nature, lower than normal business levels. Finally, there is business resumption, where business goes from a state of recovery and all that entails, to a state of normal business and operates in a way that is consistent with operations before the incident. Each stage of this process has to be considered as an individual planning scenario that links everything else. The question, "how do I do that?" must always be asked and never assumed. Everything must be verified in order to avoid the pitfalls that may be encountered.

From Continuity to Resumption

Business continuity plans are run from the recovery site; when the incident is over, staff and processes are moved back to the normal place of business or into new premises. During a very short incident—for example, only a few days—this is not difficult, because in effect, the company is running its business continuity plans in reverse. However, if the company has been working at a recovery site for a number of weeks, the process is more complex.

This is because the driving factors that were in place when the business continuity plan was activated are no longer driving factors in the resumption plan, since the incident is no longer imminent and providing the impetus to force staff to make decisions rapidly. If the incident was prolonged, the staff and processes may be embedded at the recovery site. Also, when staff and processes are moved back to either the original site or a new site, the recovery site will need to be kept operational until the percentage of work done at the main premises takes over from the recovery site.

During the incident, normal management processes are necessarily bypassed or simplified, and the chain of command becomes less complex so that decisions can be made more rapidly. After the incident, normal management processes are reestablished over a period of time that is dependent on how long the recovery site has been maintained. At this point, the driving force for rapid decision making has been lost, becoming a hindrance to the recovery process. This is caused by the personnel's physiological need for order and routine and their resistance to change once the urgency and fundamental driver has been removed from the situation. This trait has been well documented by consultants dealing with change management when confronting the same issues.

Not only is this a factor in planning to move staff and processes into their new, normal premises, but it also plays a part when looking at vendors and contractors, although these are easier to manage as they are normally under contract to deliver to a company-specified site. The problems will manifest themselves when the move of some staff from the recovery site to the new site is instigated. This is because vendors will have the problem of delivering to both sites, as the recovery site must be kept open until the new, normal site can function at a level at which the work flow matches and then surpasses the work flow at the recovery site. The work flow at the recovery site decreases as the work flow at the new site increases.

A problem may arise with vendors and contractors if a contractor delivered products to the normal business premises (a single site) before the incident. During the recovery, the vendor is

Students from the University of Findlay, in Findlay, Ohio, help repair the local Java Station coffee house that was damaged by flooding downtown, September 15, 2007. Public service offices and businesses were half-emptied and lacking electricity during the severe August flooding event that swamped the upper Midwest and Plains areas. This business would use a business resumption plan to go from this state of recovery to a state of normal business, operating much as it did before the incident.

delivering to the single recovery site, but in the resumption planning period—when the recovery site needs to be kept operational while the main site is made operational—vendors may need to deliver to both sites. This would not be a problem if both sites were in close proximity, but if they are many miles apart, costs will increase and legal requirements (such as driver working hours) may come into play. The more fundamental problem is making sure the right product is delivered to the right site. Failure to do this will cause a breakdown or delay in the process, thereby causing a discontinuation of the business.

Challenges of Resumption Planning

One of the major activities where resumption planning has been unsuccessful is working out the order of processes that need to be transferred back to the main site versus transfer of whole departments. Both options have potential problems because data and information used for those processes and departments are required at both locations. Operational and even legal problems may make this impractical and must be planned for in advance—not in advance of the move, but in advance of the incident. The business continuity and emergency management professional needs to pre-plan the deconstruction and reconstruction of the business and understand that one is not the reverse of the other, especially if the disruption has been long term.

This becomes more difficult if the processes are technical or have a high level of professional competence, as a point in the process may be reached where a person with key knowledge is needed in two places at the same time, possibly miles apart. This is not a problem in the continuity or recovery phases, as there is one site in each case; however, as these processes have been deemed to be vital to the organization's survival, plans must be made for reintegration while keeping some form of customer service or processes effectively running from two sites during the resumption process. In effect, this is integrating the operations and processes that are critical to the survival of the company from both sites into one, while keeping disruption to the customer base to a minimum. As there is no longer an incident underway, both management and customers will not be as understanding as to the delay in their services. The process of moving back to the original or new site can be more difficult than the initial move to the recovery site because management and other personnel may be less motivated than at the time of the incident. Take away the incident, and for any delay or disruption to the process, management and other personnel may not be as supportive as they previously were.

Conclusion

As business resumption planning shares many of the key elements of business continuity planning, most of the work of continuity planning will be needed for resumption planning. However, a great deal of additional thinking needs to be put into the move back to the original or new site. It is always preferable to move from the recovery site back to the normal business site as soon as possible, but if this is not possible, then resumption planning must be implemented if it hasn't been done already.

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See Also: Alternate Site, Corporate; Business Continuity Management; Business Continuity Planning; Contingency Planning; Critical Business Functions; Minimum Business Continuity Objective; Pre-Impact Planning Process.

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Cabinet Office, UK

The Cabinet Office in the United Kingdom (UK) supports the prime minister and the government ministers by ensuring that policies and operations are developed and implemented across all government departments. It also ensures that the civil service provides effective and efficient support to government in meeting its objectives. Headed by the deputy prime minister, it contains a number of ministers who have specific responsibilities, including one who is the Minister for Civil Society.

Through its National Security Secretariat, the Cabinet Office supports the National Security Council, which is the main forum for discussing the government's objectives for national security and how it can best be delivered. Membership of the National Security Council includes the prime minister, who chairs it, deputy prime minister, chancellor of the exchequer, foreign secretary, defence secretary, home secretary, the secretaries of states for the Department for International Development and for Energy and Climate Change, the chief secretary to the treasury, and the minister for government policy. Other government ministers, the chief of the defense staff, the heads of intelligence agencies, and law enforcement officers attend as required.

The Cabinet Office advises the government on its response to cross-departmental strategic issues relating to intelligence and leads on intelligence assessment and priorities through the central intelligence machinery. As such, it coordinates the government's response to civil emergencies, terrorist incidents, and international crises.

The National Security Secretariat, a part of the Cabinet Office, prepares for and manages the coordination of the government's response to crises. It was responsible for the publication of the *Strategic Defence and Security Review: Securing Britain in an Age of Uncertainty*.

Another part of the Cabinet Office is responsible for cyber security. The Office of Cyber Security and Information Assurance (OCSIA) supports ministers within the Cabinet Office and the National Security Council in determining priorities in relation to securing cyberspace. A new Cyber Security Strategy, which sets out how the UK will support economic prosperity, protect national security, and safeguard the public's way of life by building a more trusted and resilient digital environment, was published in November 2011.

Until the end of the last century, the UK was still using civil defense legislation to operate its emergency and crisis management systems. However, the Y2K threat, some serious flooding, and a fuel blockade at the turn of the century led to transferring responsibility for emergency management from the Home Office to the Cabinet Office and the setting up of the Civil Contingencies

Secretariat (CCS) in July 2001. This, in turn, led to the introduction of the Civil Contingencies Act in 2004, which provides a single framework for managing emergencies.

As a part of the Cabinet Office, the function of the CCS is to support ministers in developing policy relating to emergencies, thus ensuring that the government and key stakeholders continue to function and deliver public services during a crisis. This is achieved by working with government departments; the devolved administrations in Scotland, Wales, and Northern Ireland; and key stakeholders toward ensuring that plans, procedures, and systems are in place to cover the full range of disruptive challenges that have been identified.

The work of the Secretariat is carried out by four groups. The Capabilities Team manages the cross-government Capabilities Programme and provides secretarial support to the cabinet committees responsible for driving the program forward. Working with other government departments, the Local Response Capability Team ensures that the requirements of the Civil Contingencies Act 2004 are implemented, and it manages three capability workstreams: local response, community resilience, and recovery. The International Team is responsible for liaising with European Union and North Atlantic Treaty Organization partners to ensure that UK policy on civil protection activity is coordinated. The Exercise and Operations Team has two functions. It leads on policy relating to exercises and is responsible for the coordination of a government-wide exercise program, and, in the event of a crisis, it looks after CCS interests during the response to that crisis.

The Emergency Planning College, a part of the CCS, is the UK's leading emergency planning and crisis management training center. The aim of the college is to develop the key skills and awareness required to improve the capability of all levels of government, together with the public, private, and voluntary sectors necessary to prepare for, respond to, and recover from potential crises.

When a crisis occurs in the UK, the committee set up to deal with it is often referred to as COBR or COBRA. This is a term coined by the media; it is not officially recognized by the government or emergency responders. The former merely stands for the Cabinet Office Briefing Room, that is, the room in which the committee meets, the latter for Cabinet Office Briefing Room A, because the meeting used to be held in Conference Room A within the Cabinet Office.

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See Also: Department of Homeland Security (DHS); Federal Emergency Management Agency (FEMA).

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Carrying Capacity

Carrying capacity can be defined simply as the ability of a given environment to sustain the current and anticipated utilization of its resources in a sustainable manner without deterioration. For example, carrying capacity in the context of the natural environment is the ability of the ecosystem to sustain a certain population of animals without degradation of pasture, water, and habitat. Looking at the issue from the perspective of human societies, it is generally believed that Earth has only a certain carrying capacity to support the resource needs of the populations, beyond which the environment will deteriorate and resources will be depleted, thus irreversibly and negatively affecting populations.

This article examines the theoretical and practical dimensions in regard to carrying capacity, examples of different resources, ways in which carrying capacity can be interpreted, measures of carrying capacity, and relationships between carrying capacity and disasters.

Considering the issue at a more practical and tangible scale, carrying capacity of localized systems such as a piece of pasture land, a city, or a river can be stretched beyond a maximum limit, resulting in disasters. For example, the pasture can be overgrazed by increasing numbers of livestock herds, leading to depletion of grass, which then leads to death of animals, which leads to starvation, malnutrition, and death of human populations sustained on this land. Similarly, riverbeds can be used for construction of houses, growing crops, and so forth, and during flooding these are devastated, resulting in death of populations. In an overcrowded city (an urban ecosystem), a fire hazard can easily cause a major disaster as people cannot run away or protect assets, or a disease outbreak can spread easily, leading to mass morbidity and mortality.

Carrying capacity needs to be understood from a range of interactions and interrelationships. The most important are the relation between supply and demand for resources, between populations that share the resources and cooperation/competition between them for the resources, and management actions (policies, laws) preserving/conserving resources for the future and the overwhelming need of the current generation.

This article discusses some of the factors and human actions that are known to be negatively affecting and reducing the carrying capacity of different ecosystems and their impact on the ecosystem, including disasters. Examples of three resources—water, land, and forest—are provided below, including the way human populations benefit from them and the actions that degrade these resources and their impact.

Water, Land, and Forest Resources

Water resources include groundwater and surface water in oceans, rivers, and glaciers. Water is a critical resource for survival by supporting food, commerce, energy, and several production systems. Key concerns include overutilization of the resource beyond the ability of the system to recharge, and pollution by dumping domestic, industrial, and toxic wastes. Dams created on rivers for hydroelectric and irrigation systems are also noted to accentuate flooding in the catchment areas. Critical impacts include scarcity and depletion (especially groundwater), leading to loss of food production, spread of communicable diseases, and severe conflict over the resources among populations. Sustainable water management is a growing body of knowledge and practice meant to conserve and preserve water resources. Pollution control initiatives across large river systems have been tried around the world with great success. Micro water harvesting structures have been identified as a feasible alternative to large dams for irrigation and present minimal or less environmental impacts. Recycling and reuse of water is another strategy that is being increasingly used in industries, municipalities, and offices as well as in individual homes.

Land is a resource for agriculture, human settlements, industries, and many other livelihood systems. Key concerns include degradation from excessive use (e.g., depletion of the productive surface soil), use of chemicals in agriculture systems, dumping of wastes, and overcrowding (especially in cities). Impacts include reduced agriculture production and conflicts between communities. Several strategies for integrated land management have been developed globally in order to better achieve sustainable land use practices. These include national government policies regulating land use patterns, urban zone planning, proper disposal of hazardous waste, land reclamation programs in degraded areas, and reduction of soil loss through tree planting and increasing vegetative cover.

Forest resources provide timber for housing; sustain animal and bird populations that also provide food for gathering communities (e.g., tribal populations); support sustaining atmospheric regulation and rain, working as a carbon dioxide sink and supporting watersheds; and offer recreational opportunities (including tourism). Massive deforestation in order to meet increasing resource demands of growing populations and conversion of forest land to other uses such as industry and mining, agriculture, and housing are resulting in drastic reduction in forest cover, leading to fluctuation in global atmospheric processes and climate change, loss of species, and shrinking of tribal populations. Lack of forest cover also leads to denudation of soil cover. The issues involving forest resource degradation have been identified as a critical element within environmental conservation and preservation policies worldwide. A range of interventions and strategies have been put in place, including laws against tree cutting, policies on use of forest land, and development of alternatives for timber (e.g., use of concrete poles instead of timber in railway tracks, high-density plastic slabs used in house construction instead of timber).

Principles

Carrying capacity can be explained through the following principles:

Carrying capacity of a system can change. With the invention of new technologies, finding of alternative resources and technologies, and changes in resource use patterns, carrying capacity of a given system can go beyond what it could have otherwise supported. Renewable energy sources such as solar, wind, and nuclear have helped populations reduce dependence on fossil fuels, thereby creating opportunities for human populations to expand in otherwise inhospitable areas, increase energy use, and create better living conditions. At the same time, carrying capacity of a system can also reduce with dependence on factors that hasten to degrade resources. Oil spills in the ocean are one such example, wherein the entire fish and aquatic life can die out. Large forest fires can decimate hundreds of thousands of hectares of pristine forest land. Extinction of dinosaurs is widely believed to have been caused by meteorite hits on Earth.

Carrying capacity is also a function of time. This is linked to resource utilization (or misutilization) over a period of time by a given population. It is simple to assume that all other factors being constant, more time spent will lead to increasing utilization of resources by a population. This is especially true for fossil fuels, which take millions of years to be produced and do not regenerate. Similarly, more time spent can also mean opportunity for creation/invention of alternate resources and regeneration of depleted resources (e.g., forest and grassland growth).

Spread effects in regard to carrying capacity. Interrelationship between different levels and types of ecosystems means that an adverse or positive impact on one ecosystem can also affect other ecosystems surrounding it. For example, heavy pollution load on a landmass (industrial waste disposal) can mean contamination of the groundwater as well as pollution of the nearby river system. Similarly, conservation efforts in a forest area (plantation, stopping tree cutting) can

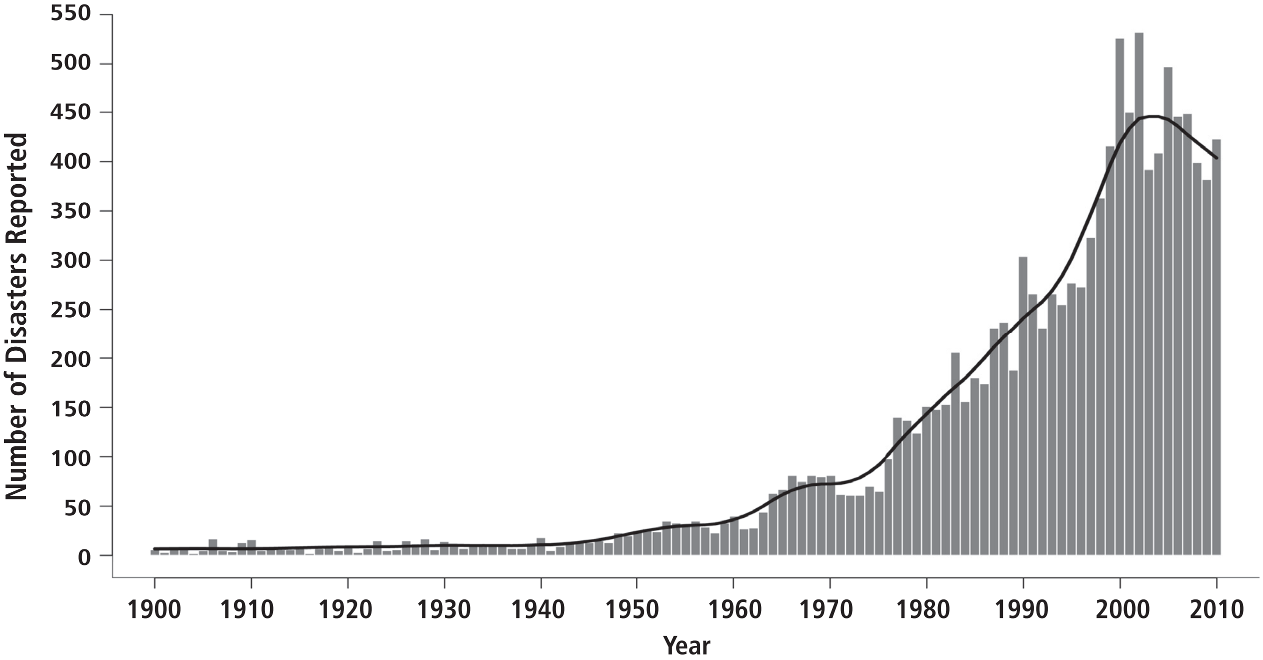

Figure 1 Natural disasters reported, 1900 to 2010
Source: International Disaster Database (EM-DAT).

mean better recharge of the groundwater and increased wildlife population.

The impact can also cascade through the ecosystem upward or downward. For example, contamination of small rivers and rivulets feeding into a larger river or lake can mean pollution of the latter, thereby reducing carrying capacity (death of fish and aquatic flora and fauna, algal bloom, etc.).

Carrying capacity can be explained at various scales. For example, we can research and talk about the carrying capacity of an entire ocean and, at the same time, look at the carrying capacity of individual small islands within these oceans.

How to Calculate Carrying Capacity

Calculating carrying capacity is difficult and complex given the dynamic nature of elements that determine carrying capacity. Some of the factors that need to be taken into consideration when determining carrying capacity are as follows. Quantification of all the factors below is probably impractical, and therefore a great deal of subjectivity, extrapolation, and interpretation need to be used in developing understanding of carrying capacity:

- Population size: current population, rate of growth, migration (in and out), fluctuations
- Knowledge and understanding of the resources: relationships between them, and support thresholds
- Seasonality and time frame: fluctuation of resources during the year and over a period of time
- Social factors: types of uses, ethical practices in resource use and sharing/competition between populations, legal frameworks, overdependence on some resources over others
- Technological factors: understanding of resources available, development of alternatives, options available
- Economic factors: cost for use of resources, trade relations between countries regarding resource sharing
- External factors: disasters, diseases, and other extreme events such as weather and climate changes

Carrying Capacity and Human Populations

Human activities are causing significant environmental impact at a wider level and thereby stretching the carrying capacity of the surrounding ecosystems and the Earth's ecosystem as a whole. Climate change, global warming, deforestation, and global sea level rise and flooding of low-lying areas, due to increasing industrialization, the load of toxic gases on the atmosphere, and increasing global population, are some of the biggest challenges facing world populations. Links are being established between these issues and increased frequency of natural disasters such as flooding, landslides, and drought as well as conflict between communities over scarce resources (e.g., conflict between north and south Sudan, conflict between pastoralist communities in several east African countries such as Ethiopia, Kenya, and Uganda).

Figure 1 provides a summary from the International Disaster Database of disaster trends from 1900 to 2010, indicating the increasing risk to populations and economies. There has been growing recognition of the need to address the above challenges, thereby not overstretching the carrying capacity for current and future generations.

Several international conventions, frameworks, and coordination structures have been developed in order to address issues of climate change, sustainable development, and disaster risk reduction. Some of the key stakeholders bringing together a range of global actors are as follows:

- United Nations Framework Convention on Climate Change, Kyoto Protocol (http://unfccc.int/2860.php)
- United Nations International Strategy for Disaster Reduction (http://www.unisdr.org)
- Hyogo Framework for Action (2010–2015): Building the Resilience of Nations and Communities to Disasters (http://www.unisdr.org/we/coordinate/hfa)
- Rio +20-United Nations Conference on Sustainable Development (http://www.unisdr.org/2012/rioplus20)

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See Also: Deforestation; Environment Programme, UN (UNEP); Environmental Contamination; Food

Security; Freshwater Demands and Shortages; Global Food Crisis; Overpopulation.

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Cascading Crisis

A cascading crisis is an unexpected event, or series of events, that creates a damaging domino effect of failures within or across systems. Although some cascading crises seem to stem from a single trigger event, others are created by the compounding of multiple interaction effects. The waves of ensuing failures result from the growing complexity and increasing interdependence of society. Global markets, increased mobility, and advanced technology have led to a complex network of social, corporate, industrial, financial, technical, infrastructural, and administrative systems. What once would have been classified as a localized crisis can have reverberating effects across these increasingly dynamic and interdependent systems. A cascading crisis can impact multiple industries and jurisdictions across geographic boundaries (local, regional, national, international), policy and societal sectors (environmental, health, economic, foreign policy), and critical infrastructures (energy, banking and finance, transportation, human services, telecommunications). The complexity of internetwork reliance creates systematic vulnerabilities prime for a cascading crisis.

Cascading crises often go beyond the conceivable scope of crisis management planning. Crisis management concentrates primarily on risks within an entity’s locus of control. Localized risks are more common, and predetermined strategies can be enacted quickly to mitigate the crisis. Crisis managers also develop strategies that can be enacted to limit the effects of crises beyond the entity’s locus of control. For example, an organization cannot control whether it is hit by a tornado, but it can control how warnings are communicated to onsite stakeholders, identification of safe shelters, plans for resuming operations if the primary location is damaged, and development of policies for employee leave to help with cleanup if other areas of the community are damaged. Because a cascading crisis can be caused by a multitude of factors beyond the control of a crisis manager, identifying vulnerabilities and predetermining strategies to address cascading crises is challenging. Three core areas of crisis management research lend to our understanding of cascading crises: normal accident theory, chaos theory, and transboundary crisis.

Cascading Crisis as Normal Accident

Normal accident theory provides insight as to why cascading crises occur. Normal accident theory describes the ways in which normal, routine failure may lead to catastrophic crises through the interactive complexity that develops around larger-scale sociotechnical systems. As systems become technologically intense, they increase in complexity and interactivity, creating tightly coupled systems. Tight coupling occurs when initial failures can rapidly bring down other parts of a system because there is little to no slack or buffer between the parts. Thus, crisis managers do not have the time or ability to make corrections before failures affect interrelated parts or other systems.

Even on a small scale, cascading crises can have broad impacts across industries. For example, the modern food production system has become increasingly complex and susceptible to systemic breakdowns. The 2008–09 salmonella outbreak in processed peanut products was caused by contamination in two plants owned by one company supplying less than 2 percent of peanut products in the United States. And yet, because Peanut

Corporation of America (PCA) was an intermediary processor that sold ingredients to other companies, more than 3,900 products including snack crackers, granola bars, cookies, and ice cream from more than 200 companies were recalled. Jarred peanut butter, while unaffected by the recall and unrelated to PCA's processing, also experienced a sharp sales decline. Poor crisis management by a company that supplied less than 2 percent of all peanut products and a reliance on supplier testing systems sickened 714 people, contributed to nine deaths, and cost the peanut industry an estimated $1 billion. In a cascading crisis, organizations cannot control how the actions of another entity will ultimately affect the bottom line. Directly affected organizations that purchased peanut products from PCA should have prepared for how a failure in the supply chain could manifest into a crisis. However, jarred peanut butter companies had no locus of control over the sanitation of PCA or the quality of the products it shipped and no way to silence the cascading crisis that echoed through the peanut industry.

Cascading Crisis as Chaos

Chaos theory provides additional insight into understanding cascading crises by emphasizing the complexity, nonlinearity, and lack of simple predictability associated with complex systems. When systems reach high levels of complexity and nonlinearity, enacted through interdependent networks, cascading crises are inevitable. The bifurcation point, or trigger event, is difficult to identify because so many fractals interact to create the cascading crisis. Chaos theory suggests that self-organization will ultimately occur as strange attractors come together to bring the spiral under control; however, the new system creates a higher level of order and another level of complexity that can contain the damage or produce more drastic effects at a later date. The 2008 nationalization of Fannie Mae and Freddie Mac to mitigate the mortgage crisis in the United States and the European Union's 2012 bailout plan for Greece and Portugal to save the euro are examples.

The root of a cascading crisis in the financial sector is difficult to identify. In 2007, as the housing bubble in the United States began to deflate and subprime mortgage losses accumulated, little was done to prevent the inevitable fall of banking giants until the entire financial industry was facing either bailout or bankruptcy. The challenge in understanding cascading crises is that there is not always a single identifiable trigger event or tipping point that starts the domino slide. The butterfly effect described in chaos theory provides the metaphor for how small variances in a system can cause much larger impacts. Potentially innocuous changes in mortgage lending options, oil prices, and tax policies can lead to devastating effects on a much larger scale.

Although one trigger event may be difficult to identify, debt crises do provide a clear example for how an industry can become so interdependent. Subprime buyers were able to take out high-risk loans from local banks. Those banks sold the loans to larger banks, which sold the loans to even larger banks, which sold the loans to mortgage giants and financial investment banks, which ultimately had to get loans from the U.S. government to avoid bankruptcy. Once the crisis was triggered, strategies had to be determined for how to contain the damage as it rippled through the financial sector.

Cascading Crisis as Transboundary

Cascading crises are often transboundary, crossing political, functional, and temporal boundaries. Political boundaries are commonly crossed in national disasters that overwhelm local government. Unfortunately, when assistance is requested from state, national, or international governments, the response can become more complex rather than more efficient, as was found in the response to Hurricane Katrina in 2005. Cascading crises can also cross functional boundaries threatening multiple infrastructures, such as the mortgage crisis tightening credit lines for automakers who also received bailout loans from the U.S. government. Finally, while some crises have a defined timeline, others transcend temporal boundaries. For example, the Chernobyl disaster was triggered in 1986, but the lasting health effects can still be seen today as elevated cancer cases continue to be reported in areas contaminated by the nuclear fallout. If a crisis is transboundary, it may not even be recognized as a potential risk by the affected entities. This is why cascading crises can escalate so rapidly. By the time entities recognize how they could be impacted by a cascading crisis, they are often already feeling the effects.

The March 11, 2011, earthquake along the northeast coast of the Tohoku region of Japan provides a devastating example of a transboundary cascading crisis. The 9.0 earthquake—the largest ever recorded to have hit Japan—generated a wall of water that swept away homes, businesses, and almost 20,000 lives. The waves from the tsunami also triggered meltdowns of three reactors at the Fukushima Daiichi nuclear power plant, releasing radioactive material and forcing the evacuation of about 90,000 people from their homes. The compounding natural disasters and technical disaster crossed political, functional, and temporal boundaries, and the cascading effects could be seen around the world.

The quake was felt hundreds of miles from the epicenter, but the tsunami caused the most destruction as it swept over the political boundaries of hundreds of cities and dozens of prefectures. Local, regional, and national response efforts were quickly overwhelmed, and aid from the international community had to be coordinated. Political boundaries were also crossed as nuclear agencies and experts from around the world were brought in to assist the Tokyo Electric Power Company (TEPCO) in containing the radiation emitting from the damaged nuclear reactors. The plant was eventually shut down in December 2011, but the crisis continued to spread throughout the nuclear industry. A year after the disaster, all but two of Japan's 54 commercial nuclear reactors had been taken off-line until safety could be assured. Germany halted its nuclear power industry, and the U.S. plans to renew investment in nuclear power stalled. A tsunami, caused by an earthquake, triggered the technical failures at Fukushima Daiichi nuclear power plant, but the effects reverberated across the energy sector as reliance on domestic and foreign fossil fuels increased.

Both the immediate effects of the earthquake and tsunami and the ensuing energy failures crossed functional boundaries. The Tokyo Stock Exchange plunged in the week following the earthquake, taking shares of Toyota, Nissan, Sony, and Panasonic to devastating low prices. Japan's manufacturing sector was hit particularly hard as property damage and workforce displacement created shortages for automakers, technology firms, and several other industries. As a major supplier of technical equipment parts, Japan's shortages left manufacturers using just-in-time strategies around the world without parts in the weeks and months following the crisis. The energy crisis created additional backlogs in the supply chain. Before the crisis, nearly a third of Japan's electricity came from atomic energy. Rolling blackouts and brownouts to conserve energy limited recovery as production was curbed by power shortages.

The crisis also crossed temporal boundaries. Thousands of people lost their lives in the immediacy of the earthquake and tsunami, and hundreds of thousands were still without homes a year later. Across functional boundaries, the tourism industry dropped nearly 60 percent in the months following the earthquake. A year later, the industry had almost fully recovered. Meanwhile, the agricultural industry will continue to be impacted by the nuclear fallout for years to come. Once prosperous farmland in the Fukushima Prefecture now only grows toxic crops farmers cannot sell and are too afraid to eat. Lasting health effects from the radiation absorbed over time will take decades to materialize in the form of increased cancer cases in the communities surrounding the power plant. The 2011 Japan earthquake, tsunami, and nuclear disaster is a prime example of a cascading crisis.

According to normal accident theory, cascading crises will only increase in frequency and severity as technology advances and systems and societies become more interconnected. Identifying vulnerabilities to cascading crises will continue to challenge crisis managers, but expanding the scope of crisis management planning to incorporate additional slack and contingency plans can limit the effects of cascading crises.

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See Also: Chaos Theory; Coupling; Critical Infrastructure; Damage Containment; Normal Accident Theory; Supply Chain; Trigger Events.

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Catastrophe, Definition of

In the disasters literature there is controversy about whether the term *catastrophe* can be differentiated from *disaster* or whether they are synonyms. The word *catastrophe*, which first appeared in the English language in the 1500s, comes from the ancient Greek word *katastrophe*, meaning “overturning” or “sudden turn,” and its Latin derivative *catastropha*. It denotes a moment of sudden cataclysm, in which things change inexorably. Setting aside exaggeration and hyperbole, a catastrophe can be considered to be an unusually large disaster.

In functional terms, a catastrophe can be differentiated from a disaster in the needs and responses it generates (see Table 1). It is likely to overwhelm the capacity to respond of the local area that it affects. It may also overwhelm regional capacity and demand a national or international response. For example, the Haiti earthquake of January 12, 2010, killed at least 230,000 people and, because Haiti is the poorest country in the Western Hemisphere and was quite unable to cope, it elicited a response from 129 nations. Catastrophic disasters almost always result in an international appeal for aid and assistance. Commonly, about 70 nations may respond by sending cash, relief goods, or personnel. The exceptional impact, suffering, and international response involved in the Haiti earthquake surely qualifies it to be regarded as a catastrophe, hence a disaster of exceptional magnitude and impact.

There have been numerous attempts to quantify the thresholds at which events become disasters. For instance, the EM-DAT database of the Centre for Research on the Epidemiology of Disasters at the Catholic University of Louvain in Belgium defines disaster as involving 10 or more deaths and 100 or more people affected, and requiring a declaration of a state of emergency or a call for international assistance. Although it is sometimes necessary to come up with a means of differentiating or classifying such events, disasters are sufficiently complex events to defy efforts to constrain them to specific thresholds, and that is even truer of catastrophic disasters. In other words, such events are in some way exceptional, but what defines “exceptional” is open to many different interpretations.

The advent of the 3rd millennium gave rise to some ill-conceived predictions of global catastrophe, but it did redress the balance after two centuries in which the doctrine of uniformitarianism had the upper hand over catastrophism. The latter advocates large, violent events as the source of global changes, while the former theory argues for gentle, continuous processes as the main source of developments. In reality, both the physical and the social evolution of the world are functions of both catastrophic and continuous processes and are complex enough for it to be very difficult to discern which of these is the more important. Moreover, catastrophic events, such as major volcanic eruptions, that can have a significant impact on global climate or social processes are very rare and hence cannot adequately be evaluated statistically.

Nonetheless, events have occurred that show how the interlinking of phenomena can increase the potential for catastrophe. The Great Eastern Japan (or Tohoku) Earthquake and Tsunami of March 11, 2011, involved a magnitude 9.0

Case Study: Events That Have Shaped the Definition of Disaster

The Indian Ocean tsunami of December 26, 2004, affected 12 countries over a vast area of Asia and Africa, killed about 230,000 people, injured 125,000, and displaced 1.69 million. It was generated by one of the 10 strongest earthquakes in recorded history, with an estimated magnitude of 9.1–9.3. It thus fulfills any reasonable definition of a catastrophe. However, one might say the same of some rather smaller events. Hurricane Mitch, which struck eight Caribbean and Central American countries in late October 1998, killed 11,000 people, many fewer than the Haitian earthquake, yet it is reckoned to have set back economic development in some parts of the region (notably in areas of Honduras and Nicaragua) by 20 years. If it were not something of a contradiction in terms, one might call Mitch a "catastrophe at the local level." In this sense the occurrence of catastrophe is in direct relation to the sum total of human suffering generated, but this is not easily measured or even adequately conceivable in robust scientific terms. Nor is it uniform even within a single disaster.

A woman searches in the rain through debris where her house once stood in Banda Aceh, Sumatra, Indonesia, in January 2005. The December 26 catastrophic earthquake and tsunami affected 12 countries in Asia and Africa, killing about 230,000 people.

earthquake, a maximum wave height of almost 39 meters, and widespread contamination by radioisotopes emitted from the damaged Fukushima nuclear power plant. This was obviously an exceptional event and, with 19,500 deaths, well within the bounds of catastrophe. But both natural events and human-induced catastrophe (particularly that which involves nuclear fission) could cause significantly worse events, perhaps orders of magnitude larger. Moreover, very high death tolls are forecast for future earthquakes in cities such as Istanbul and Tehran, again diagnostic of the potential for catastrophe.

Two Further Interpretations

Two other interpretations of the term *catastrophe* deserve mention. Both are hardly compatible with the matters discussed above. First, catastrophe theory is a subset of the branch of mathematics known as bifurcation theory and a special case of singularity theory in geometry. In this, small changes in a nonlinear system can cause abrupt changes in system state or behavior, the so-called catastrophes, of which eight different models have been identified. Despite the name, little is inherently catastrophic about the theory, and its utility for modeling catastrophic situations is severely limited. The higher-order singularities are too abstruse to model the trajectories of relevant variables in real life. The lower-order bifurcations do little to improve models based on simple abrupt changes of state. Hence, after a burst of enthusiasm in the 1960s and 1970s, the theory has relapsed to the status of an elegant but neglected mathematical formulation.

Second, in insurance circles the term *catastrophe* is more widely and loosely employed than it is in science. Catastrophe insurance refers to

Table 1 Differentiation of size of event by process and impact

	Incidents	Major incidents	Disasters	Catastrophes
Impact	Very localized	Generally localized	Widespread and severe	Extremely large
Response	Local efforts	Some mutual assistance	Intergovernmental response	Major international response
Plans and procedures	Standard operating procedures	Emergency plans activated	Emergency plans fully activated	Plans potentially overwhelmed
Resources	Local resources	Some outside assistance	Interregional transfer of resources	Local resources overwhelmed
Public involvement	Very little involvement	Mainly not involved	Public very involved	Extensively involved
Recovery	Very few challenges	Few challenges	Major challenges	Massive challenges

Source: Based on Tierney, Kathleen. "Hurricane Katrina: Catastrophic Impacts and Alarming Lessons." In *Risking House and Home: Disasters, Cities, Public Policy,* J. M. Quigley and L. M. Rosenthal, eds. Berkeley, CA: Institute of Governmental Studies, Berkeley Public Policy Press, 2008.

protection against damage and losses caused by natural disasters, such as earthquakes, floods, and hurricanes. It is by no means universal nor entirely effective at cushioning losses. The term *catastrophe* here implies a differentiation between payments that result from single losses (a house that burns down, wind or water damage to an individual building, etc.) and collective losses in which insurance companies must pay out to many policyholders. In general terms, catastrophe insurance is controversial because it can involve unusually large risks of insolvency and because there are problems of raising enough capital to cover the risks.

Conclusion

Sociologist Enrico L. Quarantelli wrote "What Is a Disaster?" for the November 1995 issue of the *International Journal of Mass Emergencies and Disasters*. He noted, "… to be concerned about what is meant by the term *disaster* is not to engage in some useless or pointless academic exercise. It is instead to focus in a fundamental way on what should be considered important and significant. …" The same is true of the term *catastrophe*, although in both cases the controversies about meanings are unlikely to be resolved, even by very well-informed debate.

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See Also: Crisis, Definition of; Emergency, Definition of; Hazard, Definition of; Hurricanes, Typhoons, and Cyclones; Impact, Definition of; Tsunamis.

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Catholic Relief Services

Catholic Relief Services (CRS) is an international nonprofit organization that provides support for survivors in all crisis phases, from mitigation to recovery. This brief introduction discusses the history and contemporary characteristics of CRS, the philosophy of the organization, and its crisis management practices.

Organization

Initiated in 1943 by the Roman Catholic bishops of the United States to serve war refugees in Europe, Catholic Relief Services continues to focus on the poor internationally. Although a Catholic organization, CRS serves those in need no matter a person's race, nationality, or creed. The organization has traditionally focused on crisis relief and mitigation, though by the 1960s it had moved into sustainable community development efforts and capacity building strategies for broader civil society. The most recent statistics illustrate the continued activities of Catholic Relief Services. Based in Baltimore, Maryland, CRS has an annual budget of $823 million (fiscal year 2010), approximately 5,000 employees worldwide, and tens of thousands of volunteers. It assists more than 100 million people annually in nearly 100 countries.

In addition, CRS belongs to a much broader international coalition, Caritas International. Caritas, with 165 organizations in more than 200 countries, is one of the largest networks worldwide aimed at reducing poverty and injustice. This connection enables CRS to significantly scale up its support capacity during and after a crisis.

Governing Philosophy

CRS bases its crisis management on its 60 years of experience and Catholic social teaching. Some of the guiding principles most relevant to emergencies include subsidiarity (focus on grassroots level decision making and development), solidarity (all people play a role in mitigating crises), and the option for the poor (the most vulnerable must be considered when decisions are made).

A recent example of this was CRS' involvement in Haiti after the 2010 earthquake. The immediate response was the provision of food, water, shelter, and sanitation to survivors. Once the immediate threat had passed, the organization transitioned to helping individuals return to their neighborhoods with a 30-month, $38-million Community Resettlement and Recovery Program. The project will potentially assist 25,000 families to return to their communities with integrated shelter, water and sanitation, infrastructure, protection, and livelihoods solutions.

Crisis management, however, is only one of 12 different ways CRS serves the global community. With the goal of addressing issues ranging from agriculture to HIV/AIDS and public policy to education, this diversity is also reflected in the manner in which CRS approaches crises. The organization views emergencies as a symptom of larger problems, and therefore any disaster relief or recovery must be implemented alongside other development strategies. As is noted in its mission statement, the organization's goal is to "promote human development by responding to major emergencies, fighting disease and poverty, and nurturing peaceful and just societies."

Crisis Management Practices

As noted above, CRS approaches crises with a holistic vision. This vision, defined by 18 principles, fits under four general themes: focus on vulnerable populations, work with local actors, increase capacity throughout the process, and create capacities that will last beyond the intervention of the organization.

First, CRS bases programming strategies and decisions on the needs of affected populations, doing so in a timely manner. In particular, the organization targets assistance toward the most vulnerable populations; specifically, the aim is to serve marginalized social identities such as the poor, women, and children.

Second, CRS involves community members and leaders. The organization makes it a point to ensure a legitimate representation of target population input within the planning, implementation, and evaluation of activities. Additionally, CRS attempts to build upon the strengths of local partners and to develop their capacity to mitigate and respond to emergencies, while also integrating peace-building approaches and reducing intergroup tensions.

Third, Catholic Relief Services takes a critical tack toward crisis management. The organization uses a Catholic social justice approach, implementing strategies based on its assessment of justice issues. Similarly, while CRS does address the immediate problems after a disaster, it furthers its work by also assessing the root causes of the human vulnerability that turned a hazard into a disaster. This is illustrated by its long-term commitment to various projects and nations; in Haiti, for example, the organization has been working since 1954 implementing disaster response, health, safety net (grassroots development programs), and, more recently, HIV/AIDS programs.

Finally, CRS has clear guidelines that structure and inform its management efforts. CRS states that organizational management programs should coordinate with other agencies, follow the emergency planning cycle, and be designed with an explicit exit strategy in order to prevent dependency. In addition, all programs should demonstrate technical expertise and measurable indicators of positive results. Combined, these four themes outline the core principles that define CRS crisis management practices.

In sum, Catholic Relief Services, under the banner of Caritas International, is one of the largest religious organizations to work with crisis management. Its global reach and religious roots provide a strong foundation for the long-term participation of the organization in all aspects of crisis management.

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See Also: Disaster Recovery; Nongovernmental Organizations; Preparedness; Response.

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Centers for Disease Control and Prevention (CDC)

The Centers for Disease Control and Prevention (CDC) focus on practical, applied, and academic research and supporting public health activities in the United States. The CDC is housed in the U.S. Department of Health and Human Services. The CDC comprises over 15,000 employees in 168 different occupation classes, working in over 50 countries. The majority of employees work at the CDC headquarters in Atlanta, Georgia.

History

On July 1, 1946, the Communicable Disease Center (CDC) was started in Atlanta, Georgia, as an extension of the Malaria Control in War Areas (MCWA) agency from World War II. The MCWA's and the CDC's primary focus was eradicating malaria. The occupational classes were predominantly entomologists and engineers, with a few medical doctors. In 1948, the CDC was recognized worldwide for its enterobacteriaceae pathogens classification (i.e., *E. coli*, salmonella, and *Yersinia pestis*). In 1951, the Epidemic Intelligence Service was formed to protect citizens against human-made epidemics and living weapons (biological) warfare. In 1958, for the first time, a CDC team traveled overseas to investigate a southeast Asia smallpox and cholera epidemic. The first CDC "biocontainment lab" was constructed in 1969. In 1970, the name of the CDC was officially changed to the Center for Disease Control; in 1981, Center became Centers; and the words *and Prevention* were added in 1992. In 1976, the CDC investigated a new lethal hemorrhagic fever in Zaire and Sudan, which later became known as Ebola. The *Morbidity and Mortality Weekly Report* (*MMWR*) on June 5, 1981, described the first case of what would become known as AIDS (acquired immune deficiency syndrome). In 1993, the CDC investigated a vector-borne disease (e.g., rodents) in the southwestern United States that became known as hantavirus. On July 1, 2011, the CDC celebrated its 65th anniversary.

Organization of the CDC

The CDC as an organization comprises the Office of the Director (administrative), the National

Institute for Occupational Safety and Health (NIOSH), and the Center for Global Health. The NIOSH investigates and prevents workplace-related illnesses and injuries. The Center for Global Health is focused on managing and coordinating public health issues of infectious diseases, noncommunicable diseases, public health emergencies, refugee health, and addressing and reducing injuries around the world. There are also five offices of the CDC: (1) Infectious Diseases; (2) Non-Communicable Diseases, Injury, and Environmental Health; (3) Public Health Preparedness and Response; (4) State, Tribal, Local, and Territorial Support; and (5) Surveillance, Epidemiology, and Laboratory Services. Under each of these offices are a number of specialized divisions and departments.

Public Health Preparedness and Response

All CDC offices focus on crisis management and emergency/disaster preparedness. The coordinating body is the Office of Public Health Preparedness and Response (PHPR; formerly known as the Coordinating Office for Terrorism Preparedness and Emergency Response). The PHPR manages, prepares, and supports (monetary and nonmonetary) activities addressing terrorism and emergencies across international, federal, state, and local public health offices. Under the PHPR are several divisions and offices, such as the Division of State and Local Readiness (DSLR), the Division of Strategic National Stockpile (DSNS), the Division of Emergency Operations (DEO), the Division of Select Agents and Toxins (DSAT), and the Office of the Director (OD). Each of these divisions plays a supportive role in crisis management and emergency/disaster preparedness.

The DSLR is responsible for managing and coordinating Public Health Emergency Preparedness (PHEP) cooperative agreements that provide funding to state and local public health in emergency preparedness and response efforts. The PHEP works in the National Incident Management System (NIMS) framework in conjunction with state and local response efforts. The DSNS is responsible for the Strategic National Stockpile (SNS), which is a national repository for antibiotics (oral and IV), vaccines, airway equipment (i.e., oral airway, endotracheal tubes, and bag valve masks), ventilators, serum containing antitoxins, chemical antidotes, IV administration, and medical/surgical supplies. The SNS is made available in emergencies and when public health response efforts at the state and local levels are overwhelmed. The DSNS provides technical assistance to state and local jurisdictions. The DSNS also coordinates the delivery, storage, distribution, and dispensing of the SNS pharmaceutical, vaccines, and medical resources at the federal, state, and local levels.

The DEO is responsible for the CDC emergency public health management efforts of preparedness, assessment, response, recovery, and evaluation. Like other emergency management groups, the DEO is in operation before, during, and after a public health emergency. The DEO operates the CDC's Emergency Operations Center (EOC) and develops response plans, conducts training and regular exercises, and performs after-action reports. The CDC EOC is a slight variation of NIMS EOC because it is focused on public health, such as acts of terrorism (i.e., dirty bombs) and noncommunicable and infectious disease outbreaks. The CDC EOC is staffed 24 hours a day, can staff up to 230 people during an emergency, and is able to deploy medications, collect samples and specimens, and transport expert staff to anyplace on the planet. Deployment for domestic issues occurs within two hours after notification and in six hours for international emergencies.

Another program of the PHRP is the Division of Select Agents and Toxins (DSAT), which operates the Select Agent Program. The DSAT promotes laboratory safety and security through inspection and enforcement of special agent regulations, including the possession, use, and transport of toxins (called special agents) and biological agents that pose a serious threat to public health. The CDC works with the U.S. Department of Justice, Criminal Justice Information Services Division (CJIS), to aid in regulation, compliance, and enforcement. The CJIS approves individuals/groups requiring access to select agents and performs security risk investigations. DSAT also works in conjunction with the U.S. Department of Agriculture agency called the Animal and Plant Health Inspection Service (APHIS) to regulate the possession, use, and transport of special and biological agents that are a serious threat to plant and/or animal populations or products.

The Office of the Director (OD) is the administrative body of the CDC. Among many other administrative activities, the OD runs the Career Epidemiology Field Officer Program, which utilizes PHEP funds to recruit, train, and develop epidemiologists for state and local public health departments. The OD also oversees the Preparedness and Emergency Response Learning Centers, which is a network of higher education departments throughout the United States that prepares the public health workforce.

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See Also: Cholera; Ebola Virus; Epidemics; Infectious Disease; Influenza; Malaria; Measles; Noncommunicable Diseases; Pandemics; Public Health Surveillance; Quarantine; Severe Acute Respiratory Syndrome (SARS); Smallpox; Tuberculosis; Vaccinations.

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Chaos Theory

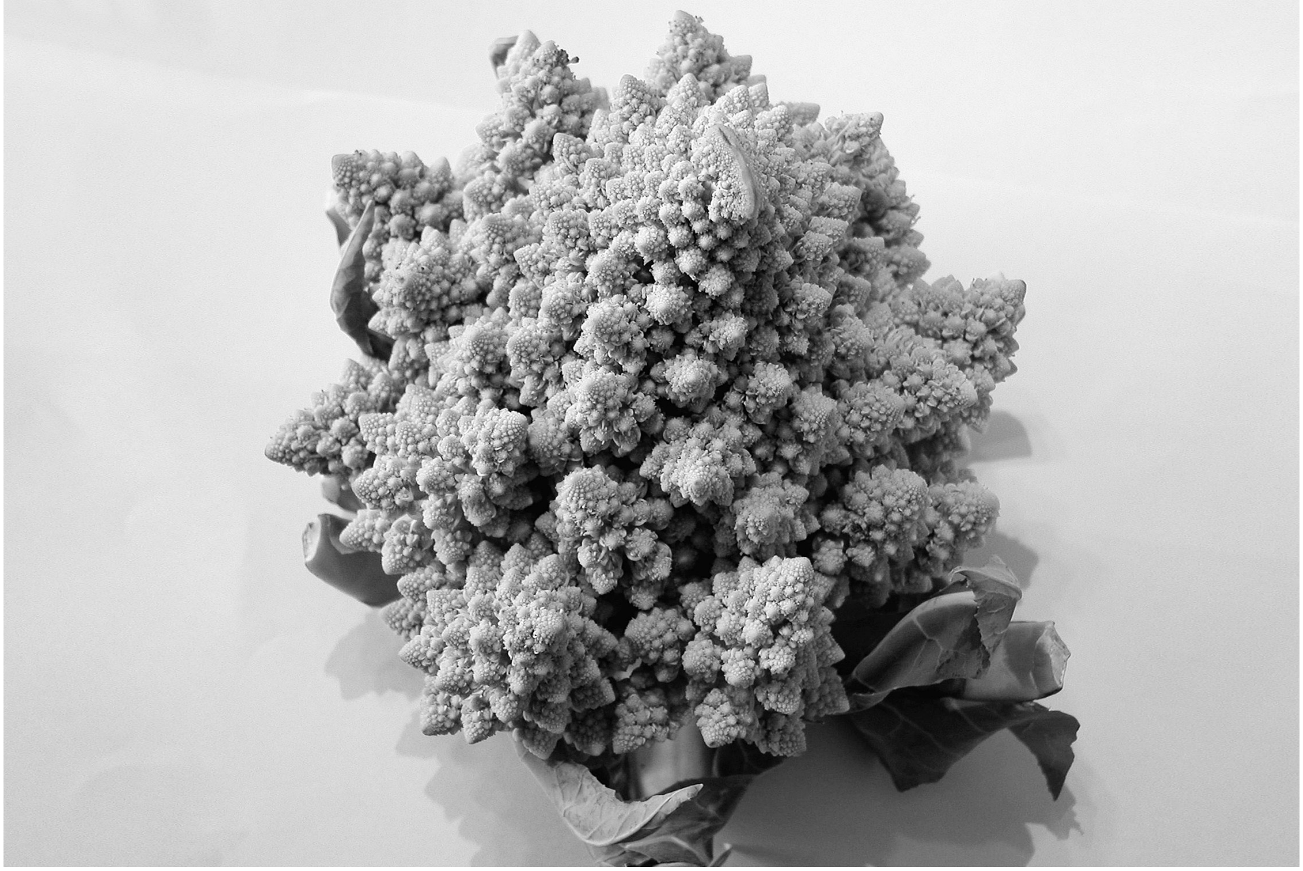
Chaos theory recognizes there is a natural tension between order and disorder. Where one expects to find order, one find chaos, and where one expects to find chaos, one finds order. Chaos theory is an extension of systems theory; however, it adds a fundamental paradigmatic shift from a worldview comprising linear systems to that of nonlinear systems. This shift in paradigm allows for a more complex understanding of how systems work but reduces the scientific certainty that cause-and-effect relationships offer. To explain chaos theory and how it relates to the area of crisis management, this article explains the major components of chaos theory that are widely applied metaphorically to crisis situations.

Sensitive Dependence on Initial Conditions

Sensitive dependence on initial conditions is commonly referred to as the “butterfly effect.” Complex systems are open and sensitive to environmental influences, and these stimuli may affect many parts of the system directly or indirectly. The butterfly effect explains that within systems are complex relationships between the parts, which may cause some parts of the system to interact and behave in unexpected or seemingly random ways. The butterfly effect explains that small variations in the initial conditions of the system can have a large and disproportional impact on a system’s future behavior. For example, the introduction of a new species to an ecosystem can radically change the entire ecosystem because of the complex relationships within the system. As applied to crisis management, the butterfly effect illustrates the need for emergency professionals to remain mindful of how crises are complex and different and to avoid treating similar crises as identical.

Fractals

Fractals are naturally occurring phenomena that are used by crisis management scholars to represent and explain complex system behavior. A natural fractal that is commonly referred to in the crisis literature is a head of Romanesco broccoli. Looking at the head of broccoli, several scales are visible simultaneously. “Scale” refers to the vantage from which we observe an object or phenomenon. The scale at which something is observed dramatically affects the perceptions or reality of what is being viewed. For example, looking at our first scale of the entire head of broccoli, we see there is an identifiable, repeating pattern in the broccoli’s overall design. As we move toward a smaller scale, the individual florets, there is a similarity in the pattern between the head and the floret. At an even smaller scale, the buds on the florets repeat the same pattern as those found at the previous two scales. Although the design of the broccoli may change slightly from scale to scale, the “self-similar” pattern is repeated. Chaos theory holds that if one observes a single event at too close a scale, it is impossible to determine an



Fractals allow multiple scales to be viewed simultaneously. An example of a naturally occurring fractal that is commonly used in crisis literature is a head of Romanesco broccoli. Several scales, or vantage points, are simultaneously visible in the whole head of broccoli, which shows a repeatable design. On a smaller scale, there is a similarity in the pattern between the head and each individual floret. At an even smaller scale, the buds on the florets repeat the same pattern as those found at the previous two scales.

underlying pattern. Fractals allow multiple scales to be viewed simultaneously, revealing the true complexity of the system and the underlying patterns that are repeated throughout the system.

The word *fractal* comes from the Latin word *fractus*, which literally means broken or fractured. This ironic definition reveals a central tenet of chaos theory: there is order in disorder. The underlying order of a system is revealed in the repeating patterns of fractals. In times of rapid systemic change, this underlying order of the system works to restore stability, or "equilibrium," within the system. The pattern of the system's behavior may change in response to changes in the system (self-organizing); however, each new pattern is similar to the previous pattern (self-referencing), so that the identity of the system is preserved in the search for restored equilibrium. The search for order revolves around "strange attractors," which in the field of crisis management may be agencies such as the police and fire departments or values such as corporate mission statements and community values.

Crisis scholars have applied fractals to a variety of crisis management issues such as safety and maintenance procedures that were unable to detect changes in the system before a crisis occurred, community emergency preparedness activities that were not robust enough to confront complex emergencies, and flood prediction methods that did not account for the natural complexity of the environment to accurately predict flood levels. These applications of fractals to emergency situations illustrate that a macroscopic view of a system is useful for understanding the true magnitude of crises.

Feedback

Systems theory recognizes two distinct forms of feedback: positive and negative. Even though the types of feedback are called negative and positive, the type of feedback does not place a value on the content of the message. Instead, the types are differentiated by how a system uses the feedback. Negative feedback is seen as regulatory, while positive feedback is seen as a signal to change. Although these theoretical components are originally from systems theory, they are widely used in the application of chaos theory to crisis management.

"Negative feedback" refers to signals that regulate a system. The dashboard of an automobile has many negative feedback instruments designed to regulate the consistent operation of the vehicle. The fuel gauge provides feedback on the amount of fuel in the tank, so that the vehicle does not run out of fuel. The same type of negative feedback loop works in the human body. When a body needs food, the stomach may growl and the individual feels hungry. This negative feedback is intended to regulate energy and maintain the system's equilibrium. Examples of negative feedback loops are commonly found in the regulatory instruments used in industry to keep operations running smoothly, the observation instruments used in environmental scanning (e.g., water levels or temperature changes) to make necessary adjustments in dam levels or power needs, and maintenance procedures used to regulate safe, efficient operating conditions.

"Positive feedback" is a signal that a change is needed within the system. Positive feedback is often missed or ignored by negative feedback loops designed to regulate specific conditions. Positive feedback is usually outside the norm of what regulators commonly look for, and over time these ignored signals are amplified throughout the system. Eventually, the system reacts in a massive and surprising reorganization in an attempt to adapt to the change in the system. This reorganization is often found to be the cause of bifurcation points (see below) that lead to many large and complex crises, because the surprising behavior of the system often overwhelms the expectations and preparations of organizations. By recognizing positive feedback through mindful observations, a system can help organizations recognize problems and stabilize the system before it escalates into a crisis situation.

An example of positive feedback can be understood through the feedback noise of a microphone. The squealing noise is the result of the same noise being amplified over and over, and something must be changed in the system for the squealing to stop. Adjusting the volume of the amplifier, moving the location of the speakers, or changing the way the voice enters the microphone is necessary for the squealing noise to subside and normal operations to resume. While the squealing noise is occurring, the entire system is disrupted and unable to function. Some examples of positive feedback in the practice of crisis management may include strange instrument readings that may be disregarded because they are unexpected, small failures that are temporarily fixed but the root causes are ignored or unknown, or strange variances in system behavior that do not cause immediate harm and are not pursued because the system temporarily recovers. Such positive feedback is often ignored for continued efficiency; however, the cost of ignoring positive feedback may be great when a crisis results.

Bifurcation

Bifurcation refers to the process when a system radically changes its behavior, identity, and/or structural makeup to respond to changes in the environment. When a system's routine is no longer able to maintain the status quo of operations, the system adapts its behavior creatively to evolve with purpose (greater resiliency). These adaptations are bifurcations, which split from the status quo. "Bifurcation" means to split into two, but a system can undergo rapid bifurcation in times of crisis to provide the system with multiple options for adaptation. Bifurcation points are often met with fear because the system can change so radically that individuals lose the ability to make sense of the situation. However, in organizations that survive bifurcation, the system evolves creatively with increased complexity to a new environment. If a system is successful in its evolution, it will be more resilient to similar events in the future. After a bifurcation, the system will not return to the status quo. Instead, the system will be changed forever and operate in a "new normal."

Crisis management scholars use the component of bifurcation to explain how the onset of a crisis or trigger event occurs, magnifies, and radically affects the entire system. Bifurcations result in increased complexity and restructuring that enable surviving organizations to be more successful in a new normal.

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See Also: Cascading Crisis; Cosmology Episode; Interdependence; Nonlinearity.

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Chemical Risk

Transportation incidents, industrial accidents, plant fires, natural disasters, and terrorist attacks can result in the high-level release of chemicals. When a crisis arises following an accidental or intentional chemical release, the specific physical, chemical, radiological, and toxicological risks must be identified. Whether the chemical is a solid, liquid, or gas can present significantly different oral, dermal, and inhalational risks. Chemical properties such as flammability, pH, and reactivity with water or other chemicals are crucial characteristics to understand in order to mitigate the hazards they represent. Chemical properties of ionization, flammability, and reactivity can also be utilized to monitor the ambient conditions for the presence of chemical hazards. Toxicological effects can be localized or systemic, immediate or delayed, and may require specific antidotes for treatment. Crisis management of chemical risk therefore requires a thorough understanding of the various hazards presented by the specific properties of the chemical or chemicals involved. Ultimately, individuals properly trained to handle hazardous chemicals should conduct emergency response operations.

Physical Properties

The physical form of a chemical (i.e., liquid, solid, gas) and other physical properties such as smell, density, and volatility can affect the level and nature of chemical risk. Gases that are heavier than air can concentrate in low-lying areas, while those lighter than air will be more likely to disperse and minimize potentially hazardous exposure concentrations. Liquids need to be contained to prevent uncontrolled migration. Dense liquids will sink to the bottom of waterways, while less dense liquids will float and affect the shoreline. Miscible liquids like ethanol can severely alter oxygen content, affecting aquatic life. Highly volatile liquids can create inhalation hazards. While some chemicals have odor thresholds that provide good warning properties, many others are hazardous when no odor is detectable. Solids are typically less mobile than gases or liquids, but powders, granules, or dusts can create significant airborne particulate hazards during windy conditions.

Chemical Properties

Chemical risks are frequently defined by the chemical properties of flammability, corrosivity, decomposition, and pH. Corrosives are chemicals with extremely high or extremely low pH that can cause irreversible tissue destruction at the site of contact. Many irritants are diluted corrosive chemicals present at a more neutral pH. Hazardous decomposition products can be formed when a chemical compound breaks down because it is unstable, or reacts with common environmental chemicals such as water or oxygen. There are flammable gases, liquids, and solids.

Chemical properties can also be utilized to monitor airborne levels of chemicals. Lower explosive limit (LEL) detectors can be used to monitor for flammability and explosive hazards. Photoionization detectors (PID) are portable chemical monitors that can be used to measure the concentration of a wide range of volatile organic compounds. Colorimetric detector tubes take advantage of specific chemical reactions to quantify chemical concentrations.

Toxicological Properties

Toxicological properties are properties of a chemical that can manifest adverse health effects if individuals are exposed over sufficient concentrations and time frames. Toxicological risks are investigated and quantified by a variety of regulatory, industry, and advisory organizations. Risk assessments extrapolate from epidemiologic, clinical, toxicological, and environmental research and infer the risk of potential harm to people. This process results in formulation of health-protective guidelines. Toxicological effects tend to vary depending on the length of exposure. As such, exposure guidelines are published for specific time frames to account for short-term (acute) and long-term (chronic) effects. Additionally, exposure guidelines are determined for different populations such as workers and the general population, which includes sensitive subgroups such as children and the elderly.

In the United States, the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) are legally enforceable values set to protect worker health and safety. However, the regulatory process limits timely updates of these values, and therefore, exposure levels published by member-based organizations like the American Conference of Governmental Industrial Hygienists (ACGIH) are frequently more representative of the current understanding of the hazards presented by workplace exposure to hazardous chemicals. The American Industrial Hygiene Association (AIHA) publishes Emergency Response Planning Guidelines (ERPGs) that estimate the concentrations at which most people in the general population will begin to experience health effects if they are exposed to a particular chemical for one hour. Protective Action Criteria (PAC) and Acute Exposure Guideline Levels (AEGLs) are additional guidance values aimed at protecting the general public. The European Chemical Substances Information System (ESIS) also provides a variety of chemical information. Long-term environmental cleanup levels are published by federal and state agencies for air, soil, and water. These include the risk-based screening levels (RSLs) published by the U.S. Environmental Protection Agency (EPA).

Emergency Response

All workers who are involved in operations that may involve exposures or potential exposures to hazardous chemicals should receive specific training to ensure that they are able to perform their duties without endangering themselves or others. In the United States, the OSHA Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) mandates this training. The specific physical, chemical, radiological, and toxicological risks as well as the site-specific considerations are all factored into a plan to mitigate the hazards of the chemical release. Appropriate types and levels of personal protective equipment (PPE) need to be determined and available to workers involved in the remediation. Environmental testing will ultimately reveal when the site has been adequately remediated.

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See Also: All-Hazards; Chemical Weapons; Evacuation; Hazardous Materials; Hazardous Waste Disposal; Health and Medical Response Scenarios; Nuclear and Radiological Weapons; Petrochemical Risk; Safety Policies; Terrorism.

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Chemical Weapons

Chemical weapons involve the use of chemical agents and their toxic properties against military forces or specific populations during chemical warfare. Chemical agents used as weapons have been called "the poor man's atomic bomb," primarily because chemical agents are easier to acquire than a nuclear weapon but can have devastating effects on their target population. Additionally, chemical agents can exist in gaseous, aerosol, and liquid states and can be dispersed through a variety of routes depending on their desired effects.

The following expands on the concept of chemical warfare by providing a history of chemical warfare and the use of chemical agents; the different categories of chemical agents, including their health effects and treatment; and essential elements to identify chemical agents.

The History of Chemical Warfare

Research tells us that chemical weapons have been used for over a thousand years. They have been used to conquer armies and to terrorize society throughout history.

Ancient history reveals numerous cases of the use of chemical weapons. In the fourth century B.C.E. during his campaign in India, Alexander the Great and his army were attacked with poison arrows and incendiaries that created suffocating smoke. There is also evidence that as far back as 1000 B.C.E. China used burning balls of mustard and other toxic plants to smoke out its enemies hiding in tunnels. Additionally, the Spartans attacked Athens, Greece, using a combination of wood, pitch, and sulfur to create a noxious smoke, hoping to incapacitate their enemy.

Later, during the American Civil War, a New York schoolteacher proposed the use of chlorine gas in artillery shells. However, there is no evidence that this idea was ever used.

The Germans were the first to use chemical agents in artillery shells during World War I. There is evidence that they used a form of bromide against the Russians and chlorine gas on the French, Canadian, and Algerian troops. However, it is a fact that chlorine, phosgene, and mustard gas were used by both sides, resulting in over a million casualties and tens of thousands of fatalities.

During the Iran–Iraq War in 1980, Saddam Hussein ordered the use of mustard gas and the nerve agent tabun. An estimated 100,000 Iranian solders were victims of chemical attacks. Many were casualties of mustard gas, and approximately 20,000 were killed by the nerve agent.

In the spring of 1995, the Japanese cult and terrorist group Aum Shinrikyo perpetrated an attack on the Tokyo subway with the nerve agent sarin. Even though the group's method of dispersing the sarin was not as effective as planned, it still resulted in the death of 12 persons and exposure of approximately 160 to the nerve agent; another 5,000 worried and thought they had been exposed. The medical facilities were overwhelmed, and the city was in a panic. The Aum Shinrikyo had succeeded in terrorizing Japanese society.

Categories of Chemical Warfare Agents

There are six categories of chemical warfare agents. Originally there were five, but tearing agents are often listed separately from incapacitating agents.

1. Nerve agents include sarin, tabun, soman, and VX. They have properties similar to pesticides in high concentrations. Their health effects include the following:
   - Exposure through inhalation and/or direct contact with skin
   - Loss of bodily fluids through vomiting, diarrhea, and saliva
   - Abdominal pains
   - Muscle twitching and weakness
   - Visual difficulties
   - Loss of consciousness
   - Convulsions
   - Difficulty breathing

   Treatments for nerve agents include the following:
   - Remove victim from source of exposure
   - Decontaminate clothing and skin
   - Administer antidotes: atropine, pralidoxime, and diazepam
   - Ventilation
2. Blister agents include mustards, lewisite, and phosgene oxime. Their health effects include the following:

- Exposure through inhalation and/or direct contact with skin and eyes
- Reddening of skin
- Blisters filled with liquid
- Sloughing of skin
- Damage to lungs with pulmonary edema
- Immediate severe pain with lewisite

Treatments for blister agents include the following:

- Remove victim from source of exposure
- Decontaminate immediately to prevent damage
- Irrigate eyes
- No antidote for mustards or phosgene oxime—only supportive care
- Antidote for lewisite is dimercaprol

3. Choking agents include ammonia, chlorine, hydrogen chloride, nitrogen oxides, phosgene, and phosphine. Their health effects include the following:
   - Irritate and damage throat, airways, and lungs
   - Choking and shortness of breath
   - Can also irritate eyes

Treatments for choking agents include the following:

- No antidote available
- Only supportive care

4. Blood agents include hydrogen cyanide and cyanogen chloride. Health effects of blood agents include the following:
   - Hyperventilation
   - Headache
   - Dizziness
   - Vomiting
   - Convulsions
   - Breathing may stop within 3–5 minutes
   - Cardiac arrest
   - Cyanogen chloride may also irritate eyes, airways, and lungs

Treatments for blood agents include the following:

- Ventilate
- Administer antidotes: sodium nitrate and sodium thiosulfate

5. Incapacitating agents are chemical agents used to incapacitate rather than kill their intended victim(s). These types of agents include hallucinogens such as LSD and vomiting agents like Adamsite. Their health effects include the following:
   - Hallucinogenic agent effects can last for an hour to days
   - Confusion
   - Sleepiness
   - Hallucinations
   - Loss of concentration
   - Delirium
   - Vomiting
   - Headache
   - Nausea
   - Diarrhea
   - Abdominal cramps
   - Changes in mental status
   - Death can occur with excessive exposure

Treatments for incapacitating agents include the following:

- Supportive care
- Symptoms may dissipate over a few hours to days

6. Tearing agents include tear gas and pepper spray, which are used for riot control or to defend against individual attackers. Their health effects include the following:
   - Severe burning sensation and tearing of eyes
   - Irritation of nose and throat
   - Coughing
   - Difficulty breathing
   - Vomiting
   - May cause scarring and permanent damage

Treatments for tearing agents include the following:

- Remove victim from source of exposure
- Irrigate eyes

Identifying Chemical Agents

There are six essential elements that assist in identifying the chemical agent.

1. Characteristics
   - Descriptive elements:
     - Color (i.e., VX is amber in color)
     - Odor (i.e., mustard smells)

    - » Consistency (i.e., VX is oily)
    - » Physical state:
    - » Vapor (i.e., sarin can be dispersed as a vapor)
    - » Aerosol (i.e., Adamsite is disseminated as an aerosol)
    - » Liquid (i.e., VX is a liquid hazard)
    - » Persistency (i.e., VX can remain on the ground for weeks, while sarin evaporates quickly)

2. Toxicology
    - » Average incapacitating dosage
    - » Average lethal dosage
3. Physical findings (see above)
    - » Symptoms of the victims
    - » Large number of dead animals in an area
4. Protection required
    - » Personal Protective Equipment (PPE) may be mask only or protective suit
    - » Immediate action(s) may include moving out of the contamination
5. Medical management (see above)
    - » Antidotes
    - » Treatments
6. Decontamination
    - » Neutralize using copious amounts of soap and water
    - » Chemical destruction by using a solution of bleach for contaminated surfaces

Conclusion

This overview on chemical warfare, including some of the history of chemical warfare and the use of chemical agents; the different categories of chemical agents, including health effects and treatment; and the essential elements to identify chemical agents provides only a baseline for understanding chemical warfare. Further study and research is required to identify the essential elements for each chemical agent and to know how to effectively respond in the event of a chemical attack.

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See Also: Chemical Risk; Department of Homeland Security (DHS); Federal Emergency Management Agency (FEMA); Food Security; Health and Medical Response Scenarios; National Response Framework; Terrorism.

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Chief Security Officer

Organizations must go beyond managing risks in silos and build an enterprise-wide risk management (ERM) function so that a full spectrum of risks is addressed wisely, systemically, and professionally. As a business enabler, corporate security should be integrated into the overall risk management framework, resulting in deeper penetration into business risks. The demand has grown for a more holistic approach to corporate security management. For example, the convergence of information technology (IT) security needs to be more closely aligned with physical security and other corporate security functions under the umbrella of ERM. Such a convergence is especially necessary for the protection of an organization's brand and reputation as a result of improved risk intelligence sharing, collaborative decision making, and strategic risk focus and oversight from the top.

Former Deloitte Chief Executive Officer (CEO) Bill Parrett also provides new insights into corporate security and risk management. In his book *The Sentinel CEO: Perspectives on Security, Risk, and Leadership in a Post-9/11 World* (2007), Parrett gives his views that following 9/11, the security of physical assets and other major security events such as pandemics and terrorism, as well as technology hackers, are top of mind for business executives today. ERM has become an increasingly visible and important management solution, especially for the newer and more complex risks. Parrett also recognizes the ascension of the chief security officer (CSO) as a new senior-level position on the corporate organizational chart that is fast becoming a key decision maker in the top management of many U.S. companies and an indispensable ally of the CEO.

The "FIBER" Corporate Security Model

One corporate security approach is found at Deloitte, where FIBER is a practical model for the protection of all organizational assets with physical, personnel, and information security mechanisms as well as crisis management and business continuity strategies. This model provides combined security and safeguards as needed to protect the five asset classes: facility, information, business, employee, and reputation (FIBER).

According to this model, security is a value-added service with an emphasis on proactive prevention rather than reactive enforcement. All security programs are based upon threat and risk assessments and security recommendations tailored to individual and facility requirements. Security is everybody's business. The vigilance and involvement of every employee is needed under the leadership and guidance of a professional and competent security organization. The key protection principles of "deter, detect, delay, and respond" are used to provide a total security risk mitigation response.

The FIBER corporate security model demonstrates that for risk assessment purposes, the consequence analysis should estimate the potential impacts on all five primary asset classes. Recent high-profile international crises and blunders continue to show that reputational risk can pose the greatest threat to an organization's stability and value and result in drastic implications for the companies involved. It is important for reputational risk to be fully integrated into risk assessments. During a crisis, business leaders may also overconcentrate on the impacts on facility and business at the expense of people risk. For example, the lack of a robust crisis management plan and team could lead to a full-blown situation that is discernible to the public and ultimately become a trust issue both internally and externally.

Enterprise Security Risk Management

Enterprise security risk management (ESRM) exists to ensure that the risks traditionally associated with security but not always covered by ERM are properly considered and treated. In order for ESRM to be successful, corporate security needs to be able to collaborate seamlessly with other control functions, such as compliance and internal audit, to enhance the organization's security posture. In the course of implementation, corporate security would also need to build effective interfaces with other key support functions, such as human resources, communications, legal, IT, safety, and facilities management. Not only does the CSO need to understand the security threats and risks to the organization and its people, but he or she should also take an active role in understanding the nature of business operations, environments, and events in order to be able to analyze any potential reputational risk implications. An organization should focus on the following key areas to maximize the value of security and pursue security risk mitigation proactively:

- Physical security
- Information security
- Personnel security
- Crisis management
- Business continuity

In addition, there should be a systematic approach to acquiring and analyzing the risk intelligence necessary to support senior leaders of the organization in the protection of assets and the allocation of security resources. A corporate security risk assessment methodology consistent with that used by risk management should be adopted to analyze threats and vulnerabilities, assess risks to the organization, and develop recommendations for enterprise-wide risk mitigation. Senior management also needs to engage with the security agenda to set its risk appetite in navigating the risk landscape.

Corporate Security Programs

In greater detail, the following corporate security programs should form the baseline security initiatives that a CSO should focus on the following:

- Security strategy planning
- Security planning for significant events
- Security review/capability assessment/gap analysis
- Security risk assessment
- Physical security threat and vulnerability assessment
- Emergency response planning
- Crisis management planning
- Travel security program
- Private executive protection program
- Pandemic planning
- Business continuity planning
- Security education and awareness workshop/training
- Privacy and information protection
- Corporate investigation
- Drills and exercises

A Risk-Intelligent Chief Security Officer

A risk-intelligent CSO should understand the dynamics between corporate security and enterprise risk management. All primary asset classes should be duly considered for a total asset protection under ERM. According to the FIBER security concept, the consequence analysis should cover any impacts on facility, information, business, employees, and reputation. A simple, consistent, and effective security risk assessment methodology, an early security warning system, and the supporting major corporate security initiatives that a CSO should focus on in his/her everyday professional life are important elements for enterprise security risk management to be successful.

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See Also: Reputational Risk; Risk Assessment; Risk Treatment.

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Cholera

Following every natural disaster, one of the most common and rapidly spreading outbreaks, affecting hundreds of people around the developing countries of Africa, Asia, and Latin America, is cholera, contracted after a person is infected by the *Vibrio cholerae* bacterium. Patients suffer from frequent diarrhea, which often escalates into dehydration and even death. Treatment options for the disease generally include oral rehydration and a course of antibiotics to reduce the effects of the disease. However, during any post-disastrous event, providing victims access to both can be challenging and requires proper management; coordination is needed before, during, and after an outbreak occurs.

Pre-Outbreak Management

In preparing for any disastrous situation, the key step that needs to be taken is to identify the people who will likely be affected by the disaster, the services and resources that are likely to be needed, and, finally, the responsible party who is willing and has the capacity to provide the required services. Before a cholera outbreak occurs in vulnerable areas, it is therefore necessary to first identify highly populated areas with possibly contaminated drinking water and poor sanitary conditions. Once these areas are identified, the next step is to form a monitoring team that can confirm possible outbreaks. Members of this team should include doctors, epidemiologists, microbiologists, and water contamination and sanitation experts. Using modern database and mapping software, including geographic information systems (GIS) and remote sensing, the team should try to identify the locations of the possible victims, locations of the contaminated water sources, and locations of sanitation facilities, as well as the nearest possible clinics and hospitals that are able to take care of patients in case an outbreak occurs. GIS can also be used to identify locations that would be suitable for setting up new treatment facilities. Although hospitals and clinics are ideal locations for treating cholera victims, sometimes larger facilities capable of handling large numbers of people (e.g., schools, churches, and mosques, etc.) would be more appropriate. These facilities should keep large quantities of safe running drinking water, good sanitation facilities, medicines, IV and rehydration fluids and energy drinks, and trained medical professionals (a full list of required resources can be found in the World Health Organization's (WHO) required cholera supply list). In situations where clean water supplies are not available, various types of on-site purification chemicals (such as chlorine) would need to be gathered and prepared for any possible outbreaks. Oftentimes, international and governmental organizations, along with local nongovernmental organizations (NGOs), are responsible for taking care of such mitigation and preventive measures.

Outbreak Management

Usually, a cholera outbreak is confirmed by epidemiologists and medical professionals once 10–20 cases are reported. Once confirmed, the first step

A Centers for Disease Control and Prevention Public Health Prevention Service cholera treatment center in Haiti, November 2010. Cholera is easily controlled in most settings, but because of the poor water quality and sanitation problems in the aftermath of the January 2010 earthquake, cholera had an ideal setting in which to spread. As a result, tens of thousands of Haitians contracted cholera.

is to notify the nearest health officials as well as the WHO. Emergency management teams need to be formed, and these teams need to collect data on the victims in terms of their locations, attack rate, areal extent of the patients, age, gender, and any other medical conditions they may be reporting. It is also essential that the general public be made aware of the outbreak. Various media outlets, including television and radio, newspapers, flyers, billboards, and loudspeakers, can all be used to notify the public. The public also needs to be notified of the symptoms and the actions they can take to save the lives of victims. The message needs to be clear, concise, and simple to understand so that poor and uneducated people (as this is often the case in developing countries) can understand and follow the instructions. As mentioned above, during the time of the outbreak, careful attention needs to be given to the purity of drinking water supplies. Separate male and female public toilets and latrines also need to be provided if they are not available, and they need to be cleaned on a regular basis. The users should also have access to antibacterial soaps and sanitizers so that the public can clean their hands after defecation. When preparing foods, kitchen areas should be clean, and raw fruits and vegetables should be separated from cooked foods to prevent contamination. The cholera bacterium grows very well in moist environments at room temperature; therefore, foods such as milk, potatoes, beans, and eggs should never be prepared more than an hour before eating. For babies, breastfeeding is the most hygienic choice for food during the outbreak. Victims who die during the outbreak should have proper funerals with preventive measures taken in order to avoid contaminating other people with the bacterium.

Post-Outbreak Management

After any natural disaster and epidemic outbreaks, it is important to reflect on the past events in order to prepare future mitigation and emergency management plans. In cholera-endemic areas, it is essential to monitor rivers, ponds, fish farms, and other virus-causing agents so that an outbreak can be contained. Also, crisis management personnel should study previous outbreaks in order to assess what worked and what did not in terms of saving human lives. Past victims should be monitored for their health conditions and any deaths. Post-outbreak studies should also be conducted in order to identify areas, age groups, and socioeconomic conditions of the affected victims. The agencies that were involved in monitoring, testing the water contaminants, and taking care of the victims, as well as the funding agencies that provided the funds and the appropriate use of such funds, should all be examined. Looking at all of these critical issues will then facilitate effective management of future cholera outbreaks.

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See Also: Epidemics; Infectious Disease; Mass Care; Public Awareness and Education.

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Civil Protection

In the field of emergency response, basic terminology is used somewhat loosely and often in ways that translate poorly between one language and another. Although the following two basic definitions may not be adhered to in the naming of particular services, they are used for the sake of developing logical arguments. Civil defense signifies an emergency response system that is centralized at the level of national government and is designed to protect vital national institutions and their functionaries, and eventually the general public, against acts of armed aggression by foreign powers or particular groups. Civil protection is a locally based emergency response system designed to protect the general public and key institutions against the effects of emergencies, crises, and disasters of all kinds and to help ensure safety at large events such as mass gatherings. Other terms used include *civil security*, *public safety*, and *emergency preparedness*. Hence, civil defense is usually a centralized, "top-down" system managed by a national government, while civil protection is a "bottom-up" system that has its roots in local organization, although it will need harmonization, support, and coordination at the national level. The primacy of national laws, and the distinctive legal and administrative systems used in different countries, means that these systems are rarely pan-national, although interoperability across national borders is becoming increasingly desirable.

Evolution of Emergency Response Systems

To understand the distinction between civil defense and civil protection, it is necessary to look back some decades into history. The antecedents of modern civil defense can be found at various points in history, including, for example, during the American Civil War. However, in its modern form, civil defense probably began on a particular morning in April 1937. This is when a flight of new Axis Messerschmitt aircraft took off from Germany to bomb the Basque town of Guernica, where there was a meeting of the Spanish Republican government. It was the first concerted aerial bombardment in history, and Pablo Picasso depicted the agony and destruction in his famous painting of the event. The quasi-spontaneous organization of protection for the noncombatant population was the beginning of a process that grew enormously during the bombardments of 1940 through 1945. Indeed, Germany ended World War II with one of the best-organized and most extensive civil defense forces of all countries.

The purpose of civil defense forces in the 1940s was to conduct search-and-rescue operations, cordon off damaged areas, put out incendiary bombs, look after the survivors, and maintain public order in areas subject to bombardments. These processes were known in Great Britain as Air Raid Precautions (ARP). The equipment used was rudimentary: often only a helmet, a canvas bag containing a gas mask, and a few torches and ropes. The personnel mainly consisted of men who, for one reason or another, were deemed unfit to send to the front as soldiers.

On March 5, 1946, during a speech at Westminster College, Fulton, Missouri, Winston Churchill noted that "From Stettin in the Baltic to Trieste in the Adriatic an iron curtain has descended across the Continent [of Europe]." The 1940s thus ended with the rise of the Cold War and a radically new role for civil defense. Preparations were made to survive a thermonuclear exchange (if such were ever possible). The emphasis was placed on underground refuges and command centers; robust, secure, and encrypted communications systems; a general air of secrecy; military forms of command and the use of paramilitary auxiliaries; and extraordinary powers ready to be assumed by governments—or their remnants. The entire system assumed that nuclear war would be survivable, but that there would be an instantaneous breakdown in public order.

The 1970s and 1980s

In the 1970s and 1980s, civil defense underwent a gradual decline. First, there was a slow withdrawal from the mentality of the Cold War, coupled with a growing sense of détente between the superpowers. Second, people and planners began to recognize the demonstrable futility of many of the preparations made to survive a putative nuclear strike, and the waste of resources that these entailed. Third, the growing effect of natural disasters demanded new and more effective forms of organization. However, in many countries progress in this last field was slow as a result of political polarization (a remnant effect of the Cold War) and the effects of corruption and, when it was unmasked, very public scandals. Nevertheless, the fall of the Berlin Wall in 1989 ushered in a new period of the decline of the authoritarianism that had motivated the civil defense of the Cold War. For a period of about five years there was also a "peace dividend," and resources could be devoted to new means of protecting the public.

As a movement, civil protection began to emerge in the 1970s in response to the cumulative effect of natural disasters in causing misery, casualties, destruction, and disruption of daily life. The end of the Cold War, and the temporary cessation of associated “proxy wars” supported in third world countries (e.g., Afghanistan) by the great powers, led to a reduced risk of coups d’êtat at home and hence fewer excuses to repress the domestic population. Meanwhile, the age of the international disaster began, with increased participation in major catastrophes (eventually, after the 2010 Haiti earthquake, 129 countries sent aid).

One catalyst was the United Nations’ International Decade for Natural Disaster Reduction (IDNDR, July 1990–June 2000). This was first proposed in 1984 as a decade for monitoring extreme natural phenomena, but once it reached the UN’s General Assembly, the representatives of low- and middle-income countries had it transformed from a technology-based scientific initiative into one that offered a chance of improving the relationship between development and disasters. In the end, 140 countries set up national committees for the IDNDR and some large transnational projects were inaugurated, as were several large conferences designed to review and promote strategy. The effects were mixed, as the Decade did not greatly reduce the effects of disaster, but it did promote international collaboration and strategic aims for disaster risk reduction. The Decade was followed by the consolidation of international mechanisms into the UN’s permanent International Strategy for Disaster Reduction (UNISDR), which continues to do much good work in this field. UN-level international disaster response, as opposed to disaster reduction, remains the preserve of the Office for the Coordination of Humanitarian Affairs (UN-OCHA).

Civil protection (often in all but name) has benefited from several trends: increased global collaboration and the sharing of knowledge, the increasing impact of information and communications technology, and improved agendas for training. Under civil defense, the typical protagonist was a middle-aged, ex-military man of a certain rank, now enjoying a second or third career in civilian life. Finally, trained young people began to appear, including those from particular ethnic backgrounds. In many cases, women proved to be particularly good emergency managers, but unfortunately they remain in the minority. There remained a pressing need to improve the local organization of civil protection services, and in diverse countries also the quality of national coordination structures.

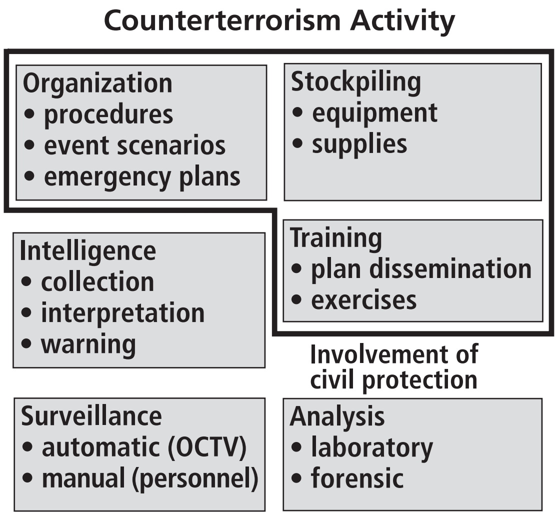

Figure 1 Involvement of civil protection forces in typical civil defense activities

Twenty-First Century

In synthesis, in the 2000s, civil protection finally distinguished itself from civil defense. It is organized at the local level (predominantly that of the municipality), with support and harmonization from higher levels of government. It is explicitly a service for the general public, and it tackles natural and anthropogenic risks of a nonbellicose nature. Figure 1 indicates how civil protection participates in only some of the actions attributable to civil defense. Hence, there is a connection, but it should not lead to the subsuming of civil protection into the civil defense system.

The events of September 11, 2001, in the United States rapidly consolidated a trend that had begun to emerge a handful of years before. This was the return of civil defense in a new form. The name chosen for it in the United States was Homeland Security. The threat of armed aggression from particular nation-states had lessened (other than in covert form by proxy), and it had increased from dissident groups. This required reorganization on the part of national forces to combat the emerging and mutating threats of domestic and international terrorism. In the United States, the Federal Emergency Management Agency (FEMA), responsible in all but name for civil protection, was subsumed under the mantle of Homeland Security, which encompassed 150 national organizations and required the greatest reorganization of the federal government since the creation of the Department of Defense in 1947. For better or worse, other countries followed the lead of the United States. Many failed to note that forms of organization that are appropriate for a federal state are not necessarily ideal in a nonfederal one, in which the relationship between the central government and the regions is different from that pertaining under federation. This problem was graphically illustrated by the debacle of Hurricane Katrina, in which federal aid to the affected states was slow and inefficient, but the states themselves lacked sufficient resources and organization to respond adequately to the disaster.

Current Organization

The two words *safety* and *security* are clearly differentiated in English, but not necessarily when translated into other languages. In the simplest terms, civil protection deals with the former and civil defense with the latter. Some countries, notably Italy, have clearly articulated and fully institutionalized distinctions between the two systems, but many do not. New Zealand, for example, has a Ministry of Civil Defense and Emergency Management, whose main competencies lie in providing civil protection support to regions, districts, and municipalities affected by natural disaster, a typical civil protection role. Likewise, the *Defensa Civil* of Colombia enjoys a typical civil protection structure, with decentralized committees at local and regional levels. Some other countries have left their disaster response with a paramilitary structure redolent of earlier forms of civil defense. China effectively began to modernize its emergency response in the wake of the May 2008 Wenchuan earthquake in Sichuan Province. It remains dependent on the People's Liberation Army because of the need for copious organized human resources.

Despite the internationalization of disaster response, civil protection remains a national competency virtually everywhere. In the European Union (EU), for example, there is a Directorate General of the European Commission (the executive body of the EU) that deals with disaster response at the supranational level, largely through the EU's Monitoring and Information Centre (MIC). A report written in 2005 by Michel Barnier, the former French foreign minister, recommended the setting up of a transnational European disaster response force, but it has not been implemented. The EU's 27 nations and various affiliates have five different legal systems and all the differences in public administration that stem from contrasts between monarchies, federal republics, island states, centralized republics, and so on. A single European civil protection organization is thus virtually impossible, although advances in interoperability are both possible and sorely needed.

Two models of organization pioneered by Italy have gained traction in other European countries and elsewhere. Commonly, at the national level, civil protection is an organ of the ministry of the interior (or similar agency), with the minister as nominal head of the service. In 2000, Italy briefly experimented with making the national civil protection organization an independent agency but found that the level of financial dependency on other organs of government was too great for this to be effective. Hence, it made the Italian Department of Civil Protection a dependency of the national cabinet under the nominal headship of the prime minister. The advantage lies in increased efficiency of relationships with other ministries, notably health, public works, and economic affairs. This arrangement was made a nonbinding directive of the European Union and was adopted by, among others, the United Kingdom and Sweden.

The second model involved a fusion between domestic and overseas disaster response (and in the case of Italy also cross-boundary European response). As the same forces and command structures have often been used in both (or all three) kinds of operations, it made sense to amalgamate their administrative structures. Subsequent to this, the European Commission created a new Directorate General that fused the civil protection arm, formerly under DG Environment, and the European Communities Humanitarian Office (ECHO).

The essence of good emergency response and management is that there be a complete system, with a strong base at the local level, especially that of the municipality. There also needs to be a cascade of information, resources, and command such that the national and international levels of disaster response are properly connected to the regional and local ones. In virtually all countries, the system is a mosaic of different levels of development, in which there are points of innovation and areas of laggard underdevelopment. The worst cases are those in which international forces and United Nations Disaster Assistance Response Teams (DARTs) must take over because of a lack of local and national forces. The international disaster response system is by nature inefficient, as resources (e.g., search-and-rescue forces) that should be present locally need to be flown long distances, with attendant delays and possible logistical shortcomings upon arrival. Other countries, such as Colombia, have systems that are excellent on paper but largely absent when one arrives in the regions and searches for the relevant agencies and organizations.

Civil protection is a cooperative enterprise that requires the conjunction of government forces, the private sector, and civil society organizations. In the United Kingdom, key private companies are required by law to prepare for disaster and participate in the emergency response system. These include the providers of public utilities and transportation. The role of civil society organizations is highly variable from one country to another. Most of these are voluntary organizations. Whereas the age of spontaneous voluntarism in disasters is well and truly over, the degree to which volunteer societies are organized, given a role in disaster response, and endowed by law with rights and responsibilities varies markedly. In Germany and Italy, volunteer organizations are the backbone of the system. Technisches Hilfswerk (THW) has 630 bases in Germany; the Venerable Company of the Misericordie has been providing volunteer disaster assistance in Italy since 1244 C.E. Voluntarism is a key element of the civil protection system in Australia, where many communities are too small and isolated to be served adequately by salaried forces. Elsewhere, it is much less significant. In Abu Dhabi, for example, organized voluntarism is a newly established element of the civil protection system.

New Trends in Civil Protection

The civil defense forces of the 1940s were paramilitary and governed by military command procedures. Ever since then, there has been a gradual process of demilitarization of civil protection. The extent to which it has occurred is virtually a measure of the degree of evolution of an emergency response service. One reason is that it is now widely recognized that authoritarian approaches to the management of civilian emergencies are counterproductive. Second, the impact of information and communications technology, now widely used in emergency management, has been to flatten the chain of command. There is now more emphasis on autonomous task forces than on command and control. More weight is given to collaboration and information sharing than to obeying orders. Third, training and improvements in equipment have greatly increased the professionalism of civil protection operatives, whether they are first responders or emergency managers. Finally, emergency planning has begun to emerge as a distinct profession and to differentiate itself from military planning (it bears a stronger resemblance to urban and regional planning than to battlefield tactics).

At the same time, new challenges have emerged that will doubtless endow the process of adaptation with yet more stimuli. Natural and anthropogenic hazards are constantly changing, and so is the balance between vulnerability and resilience in society. Civil protection forces must participate in the emerging endeavors of disaster risk reduction, the creation of resilience, and the promotion of safe, sustainable lifestyles. Climate change may increase the imperative to bring the disasters problem under control. Emerging risks—for example, those associated with pandemic influenza—threaten to change the civil protection landscape abruptly and radically, and they require substantial adaptation of plans and organization. Meanwhile, the general public's demand for safety and security fluctuates with the varying salience of disasters on the public agenda.

In the near future, the relationship between civil protection and civil defense (however they are referred to and dealt with in each country) will continue to be an uneasy one. Civil defense has responded to asymmetric threats with a series of measures designed to provide security to the public that have instead put civil liberties seriously under threat. Yet the biggest challenge of the present century is to democratize the response to the threat of disaster. The risks are simply too large to be borne solely by professional planners and responders: The general public must necessarily assume part of those risks itself. This requires not reduced liberty but participatory governance. The public must be induced to take disaster risk seriously and ensure that civil protection is a well-supported service that is applicable to all constituencies in society and is sustainable through economic downturns and all other socioeconomic changes.

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See Also: Collaboration; Command and Control; Contingent Coordination; Coordination; Coping Capacity and Response Capability; Department of Homeland Security (DHS); Emergency Management, Principles of; Emergency Management Agencies, City and County; Emergency Management System; Emergency Manager; Emergency Responders; Federal Emergency Management Agency (FEMA); International Strategy for Disaster Reduction, UN (UNISDR); Interoperability; National Response Framework; Office for the Coordination of Humanitarian Affairs (OCHA), UN; Political and Organizational Leadership; State Emergency Management Agencies; Volunteer Coordination.

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Civil War

A civil war is a war between organized groups within the same nation-state. It is a high-intensity conflict, often involving the armed forces of the state against irregular armed forces, that is organized, large scale, and sustained over a fairly lengthy period of time, for example, Lebanon in 1975–90. The aim of one side may be to take control of the country, for example, Liberia from 1989 to 1996 and again from 1999 to 2003, or to achieve independence for a region, for example, Biafra from Nigeria from 1967 to 1970, or to change a government, for example, Libya in 2011, or its policies. It generally results in a large number of casualties and uses significant resources. On average, civil wars, since the end of World War II, have lasted for at least four years.

According to the 1949 Geneva Conventions, four conditions define an armed conflict amounting to a civil war. First, at least one side must have control over a part of national territory; second, the insurgents must exercise some authority over the population within a section of that national territory; third, the insurgents must be recognized as having a fighting capability; and fourth, the recognized government uses its regular military forces against the insurgents, who must themselves be organized as a military force.

Causes of Civil War

Between 1945 and 1999, there were 25 wars between different countries in which at least 100 people were killed on each side and the overall total exceeded 1,000. The total number killed in battle during these 25 wars is estimated to be 3.33 million. In contrast, in the same period, there were approximately 122 civil wars in which at least 1,000 people were killed, and the total number killed, at a conservative estimate, is 16.2 million. Excluding anticolonial wars, which amounted

Case Study: Civil War in Angola

It was not until the early 1940s that the country of Angola—a Portuguese colony for 400 years—was constituted as it is known today. Although independence was not achieved until November 1975, two groups—the People's Movement for the Liberation of Angola (MPLA) and the National Front for the Liberation of Angola (NFLA), operating from neighboring countries—commenced a guerrilla campaign, known as the Angolan War of Independence, as far back as 1961. Five years later, a third group, the National Union for the Total Independence of Angola (UNITA), was formed. The civil war can be broken into three periods separated by two periods of relative peace. The first period, from 1975 to 1991, was followed by less than a year of relative calm before hostilities occurred again from 1992 to 1994. This was followed by three years of peace until 1998. There was then renewed conflict until, in 2002, the MPLA finally prevailed.

The Early Years

The Alvor Accord, signed by Portugal and the three independence movements—the MPLA, UNITA, and FNLA—in 1974, called for a transitional government comprising all three. However, when the Portuguese left in 1975, the leader of the MPLA, Agostinho Neto, backed by the Soviet Union and Cuba, declared the formation of the People's Republic of Angola. UNITA, led by Jonas Savimbi, and supported by the United States and South Africa, declared the country would be known as the Social Democratic Republic of Angola with its headquarters in Huambo, and the FNLA declared that the country would be known as the Democratic Republic of Angola, based in Ambriz. Twelve days later, the FNLA and UNITA became allies, proclaiming a coalition government in Huambo with co-presidents and co–prime ministers.

Neto died in 1979 and was succeeded by Jose Santos, and throughout the next nine years there were continuous hostilities between the MPLA, claiming to be the legitimate government, and UNITA. In 1988, South Africa, Cuba, and Angola agreed to cease-fires in Angola and neighboring Namibia as part of a regional peace deal. Namibia, which was a colony of South Africa at the time, had been used as a military and strategic support base for operations against the MPLA. Later, a largely U.S.-brokered treaty signed in New York by the protagonists paved the way for independence for Namibia and the withdrawal of Cuban troops, which by then numbered 50,000, from Angola. The United Nations agreed to a verification mission (UNAVEM I; Security Council Resolution 435 [1988]}, which oversaw the complete withdrawal of Cuban troops. However, despite a cease-fire agreement, the fighting continued. With the Cold War still ongoing, whatever its internal causes, Moscow and Washington saw the Angolan civil war as a subplot in the global balance of power. As a result, UNITA leader Savimbi made a number of trips to the United States, where he met with both Presidents Ronald Reagan and George H. W. Bush.

In May 1991, Savimbi and President Santos met in Lisbon, with the Portuguese government acting as mediators. The result was the Bicesse Accords, which laid out transition to a multiparty democracy under the supervision of the Security Council's UNAVEM II Mission (Resolution 696 [1991]), which lasted until February 1995. Elections for president were held in which Santos received 49.57 percent of the vote and Savimbi 40.6 percent. Savimbi, together with a number of other election observers, claimed that there had been irregularities but, in any event, because no one had received 50 percent, another round was necessary. Negotiations on how and when another election should be conducted quickly broke down, and there was renewed fighting.

The following year, 1993, a major battle between government forces and UNITA, which lasted from January to March and which cost 12,000 lives, ended with UNITA victorious. Although by this time the United States and South Africa had stopped aid to UNITA, military supplies continued to come from Zaire. By August, UNITA controlled 70 percent of territory, but government forces rallied and, in just over a year, were back in control of 60 percent of the country, forcing UNITA to sue for peace. The result was the Lusaka Protocol of October 1994, under which there was to be a government of reconciliation, joint armed forces (FAA), and a national police force (ANP). In February 1995, UNAVEM III (Security Council Resolution 979 [1995]) took over from UNAVEM II to assist in the restoration of peace and to oversee the achievement of national reconciliation.

In March 1996, Santos and Savimbi agreed to form a coalition government, and in June, Savimbi was offered the post of vice president under Santos. Savimbi accepted the position in August and announced the end of the civil war in Angola. However, he had second thoughts and refused it, as a result of which Parliament abolished the position. Nevertheless, in April 1997, the Government of Unity and National Reconciliation (GURN) was formed, but further progress was seriously undermined by UNITA's failure to comply with the terms of the Lusaka Protocol. As a consequence, in August 1997, the UN Security Council imposed sanctions on UNITA (Resolution 1135 (1997), prohibiting UNITA leaders from traveling abroad, closing UNITA embassies abroad, and making the area controlled by UNITA a no-fly zone. In June 1998, UNITA's bank accounts abroad were frozen (Security Council Resolution 1173 (1998).

To assist with the peace and reconciliation process, the Security Council authorized the setting up of a peacekeeping force, MONUA, on June 30, 1997 (Resolution 1118 [1997]), to oversee the extension of government control over the whole country, and the demilitarization of UNITA forces, and to ensure the neutrality of the Angolan National Police. Meanwhile, the United Nations, with the support of three observer states—Portugal, the Soviet Union, and the United States—continued its efforts to bring Santos and Savimbi together to overcome their deep-rooted mistrust of each other.

A lack of significant progress, for which, again, UNITA was held responsible, meant that the United Nations extended MONUA's mandate every three months until February 26, 1999. In June 1998, the secretary-general reported to the Security Council that there had been a marked deterioration in the security situation in the country, which included new mine-laying activities, the deaths of civilians and the destruction of property, and displaced persons fleeing into neighboring countries. Further deteriorations, including the loss of UN aircraft over UNITA-held territory, meant the Security Council finally terminated MONUA's mandate, and most of its forces left by the end of March 1999, although the UN maintained a presence there through the establishment of the United Nations Office in Angola (Resolution 1268 [1999]).

Dissatisfied with Savimbi's leadership, a number of UNITA commanders formed a breakaway group, UNITA Renovada, in late 1998, after which Santos refused to negotiate with Savimbi, only talking to the breakaway group. Over the next two years, many more deserted Savimbi, and in February 2002, he was killed by government forces. The leadership of UNITA was briefly taken over by the vice president, but he died of natural causes less than a month later, so the leadership passed to Secretary-General Paulo Lukamba. The following month, the government announced the cessation of military operations, and commanders from both sides met to agree on the terms of a cease-fire; a Memorandum of Understanding was signed as an addendum to the Lusaka Protocol. UNITA's new leadership demobilized its armed forces in August and declared itself a political party.

Illegal Arms

During the latter stages of the conflict, a ban on weapons was violated on numerous occasions, with the Angolan government acquiring arms and equipment from, among others, the Ukraine, the Czech Republic, India, Kazakhstan, and Slovakia, while UNITA acquired its arms and equipment from countries such as North Korea. False documents were used to describe the contents of the freighters delivering the arms.

Funding the War

UNITA's funding for the war, particularly when support from the West declined, came primarily from the mining of diamonds. Despite international sanctions, it is estimated that UNITA received nearly $4 billion from diamond sales, much of which was spent on the acquisition of arms. Hence came the term sometimes used with regard to Angola and other diamond-producing African states involved in civil wars: blood diamonds.

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Effects of the Angolan Civil War

Between 1975 and 2002, an estimated 500,000 people were killed during the war and well over 4 million people—approximately one-third of the population—were displaced. The war devastated the infrastructure and administrative setup left behind by the Portuguese and effectively prevented any economic growth. At the end of the war, the United Nations claimed that up to 80 percent of Angolans lacked basic medical care, 60 percent lacked access to clean water supplies, and 30 percent of children were dying before reaching the age of 5 years; life expectancy was less than 40 years. A product of this particular war, as has been the case in other parts of Africa, was the use of child soldiers by all sides and the forceful marriage of underage girls to soldiers, particularly to those belonging to UNITA. It is estimated that during the war, approximately 15 million land mines were laid. A demining operation that commenced as far back as 1994 is not expected to be completed until 2014.

to 13, the regions most prone to civil war during this period were Asia and sub-Saharan Africa (over 30 each); north Africa and the Middle East, followed by Central and South America (17 and 14, respectively); Eastern Europe and the former Soviet Union (9); and finally, Western Europe (2).

Some of the early civil wars following the end of World War II were, in fact, anticolonial wars; some people suggest these were wars of liberation but, given the above definition, they consisted of the armed forces of the state against irregular armed forces, such as the French military forces against the National Liberation Front (FLN) in Algeria (1954–62). On a number of occasions, these civil wars have also been described as insurgencies or guerrilla campaigns. In such cases, at least during the early stages, those opposing the government forces were often quite weak, being, as they were, lightly armed and either hiding within a sympathetic population or making use of terrain (mountains or forests) that was difficult for the conventional government military forces to penetrate, or they used cross-border sanctuaries. An important aspect in terms of whether an insurgency or a guerrilla campaign is likely to grow into a full-scale civil war, in which both sides become roughly equal, is the efficiency of the government's police and military forces at the beginning of the campaign. Insurgents are more likely to survive and grow if the government forces are brutal, corrupt, poorly equipped, and not particularly efficient.

There are two main schools of thought as to the causes of modern-day civil war, led by Paul Collier and Anke Hoeffler on one side and by James Fearon and David Laitin on the other. The Collier-Hoeffler model suggests that civil war is more likely where one ethnic group in the country is dominant, as was the case in the Rwandan civil war (1990–93).

However, the Fearon-Laitin model suggests that it is not the ethnic makeup of the country that is important in the lead-up to civil war; rather, it is a country's prosperity or lack of it. Those countries that enjoy a reasonable standard of living appear almost impervious to civil war no matter what the ethnic mix is. Rather, it is the poor countries where civil war is most likely. Even there, they only occur where the government is brutal, overtly corrupt, or so weak that it does not have control over the whole country, such as in Sudan from 1955 to 1972 and 1983 to 2005.

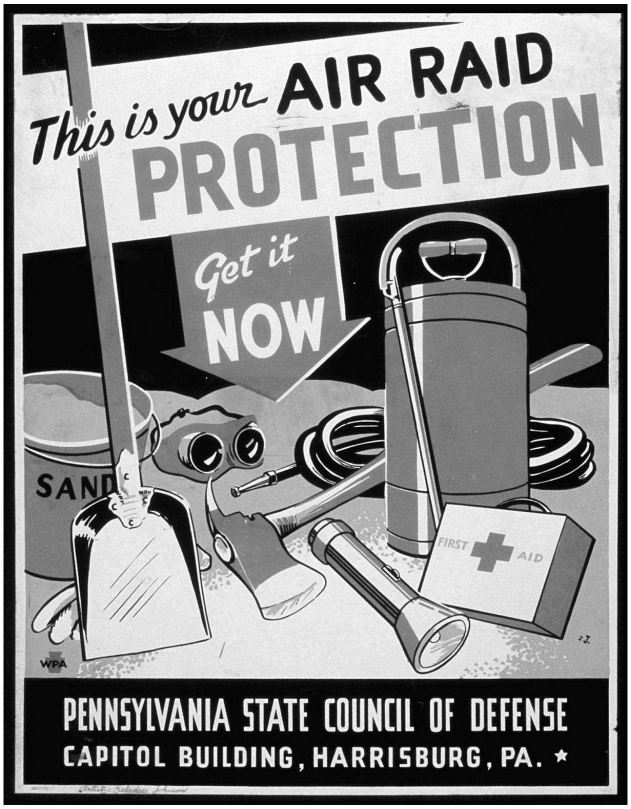
Effects of Civil War

The effects of a civil war can be catastrophic for the civilian population. Whole communities can be displaced, making millions of people homeless. Women and children invariably bear the brunt; the number of widows and orphans can increase dramatically. Civil wars also interfere with both the physical and mental development of children by destroying schools and immersing children in a culture of violence. Worse still, some children are either forcibly recruited into or willingly join the armies of one side or the other because they see no alternative. People are prevented from meeting their basic needs because crops are destroyed or large sections of land become unusable. Although it may sometimes be the by-product of war, it is often an intentional act by one side to reduce or destroy the other side's support base. Such tactics include the planting of land mines on farmland; the deliberate destruction of crops and livestock, poisoning wells; terrorizing civilians through executions, torture, rape, conscription, and resettlement; and denying food as a weapon to displaced and starving populations.

Humanitarian Aid

Humanitarian aid or relief aid is an attempt by the international community to reduce the suffering during civil wars. It normally involves the provision of tents, food, and sanitation, thus reducing the effects of the weather, hunger, thirst, and disease. Frequently, those in greatest need are in a conflict zone during a civil war. Therefore, although an effective and well-timed humanitarian relief operation has the capacity to save thousands of lives, it is an extremely hazardous operation for the aid agencies because there have been occasions when the combatants on one side or the other have deliberately targeted aid workers to gain control over relief supplies. But it can also prolong civil wars because of what is known as "aid taxation." This is a form of tax, paid by an aid agency to the side controlling the area, frequently by way of a percentage of the relief supplies, to gain access to the affected civilian population, which is then used to feed combatants.

Although the International Committee of the Red Cross (ICRC) has constantly reminded both sides in civil wars that they should abide by the rules of international law and make a clear distinction between civilians and combatants, this has rarely been heeded.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A World War II poster from the Pennsylvania State Council of Defense, printed between 1941 and 1943, emphasizes the primary idea of civilian protection: a locally based emergency response system designed to protect the general public.

Famous Civil Wars

There have, of course, been a host of civil wars over the centuries. England underwent three civil wars between 1642 and 1651 between the Parliamentarians (Roundheads) and the Royalists (Cavaliers) that ended with the execution of King Charles I and the declaration of the Commonwealth of England (from 1649 to 1653), which itself was replaced by the Protectorate, from 1653 to 1659, under the rule of Oliver Cromwell.

The American Civil War, which took place between 1861 and 1865, occurred following the election of Abraham Lincoln as president when seven southern states, in which slave labor was used, declared their secession from the United States and formed the Confederate States of America; these were closely followed by the remaining four states in which slave labor was used. Eventual victory for the North meant the end of slavery, but not until the death on both sides of some 620,000 soldiers and an undetermined number of civilians.

The Spanish Civil War, between Nationalists and Republicans, took place between 1936 and 1939, resulting in the establishment of a dictatorship under General Francisco Franco, which was to last for over 35 years. The Chinese Civil War was fought between the Chinese Nationalist Party and the Chinese Communist Party between 1927 and 1949, except for a brief period during the Second Sino–Japanese War when the two sides joined together to form the Second United Front. Once Japan was defeated in 1945, the two sides renewed the conflict until the Communists occupied the whole of mainland China, leaving the Nationalists in Taiwan.

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See Also: Arms Control; Border Disputes; Doctors Without Borders; Drought; Ebola Virus; Ethnic Cleansing; Failed States; Famine; Global Food Crisis; Interstate War; Land Mines; Office for the Coordination of Humanitarian Affairs (OCHA), UN; Peacekeeping; Poverty; Red Cross and Red Crescent; Religious Violence; Suicide Bombings; Terrorism; War Crimes; Weapons Trafficking.

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Civilian Protection, Post-Conflict

United Nations peacekeeping operations have become one of the international community's primary instruments to assist countries in emerging from conflict and securing sustainable peace and stability.

This has not always been the case. The first 40 years of the organization's peacekeeping efforts were largely oriented toward keeping the peace between two sovereign nations that had been in conflict with one another. This was done largely through deploying peacekeeping operations with military components whose principal task was to supervise cease-fires and act as a buffer between those nations. With the end of the Cold War, however, conflicts between states began to decline as conflicts within nations increased. The levels and types of violence that characterized these conflicts were increasingly complex, states were often collapsed or on the verge of failure, and civilians were frequently displaced and/or threatened with physical violence. In response to this trend, the Security Council—the United Nations' organ responsible for the maintenance of international peace and security— began to authorize the deployment of multidimensional peacekeeping operations, designed to support the implementation of peace agreements and to set countries emerging from conflict on a path to sustainable peace.

Security Council Mandate

These multidimensional peacekeeping operations—operations made up of military, police, and civilian components—are generally deployed in the dangerous aftermath of a violent internal conflict, in which the physical security of civilians is often at risk. Recognizing that United Nations (UN) peacekeepers could have an important role to play in protecting civilians in these situations, the Security Council began to authorize peacekeeping operations with the mandate to protect civilians "under the imminent threat of physical violence." The first such peacekeeping operation (or "mission" in UN parlance) to have received this mandate was the United Nations Assistance Mission in Sierra Leone (UNAMSIL) in 1998. Since that time, 11 missions have received the protection of civilians mandate. In September 2012, there were eight peacekeeping operations authorized to protect civilians.

The Nature of Protection of Civilians Crises

Where modern, multidimensional peacekeeping operations are deployed, civilians often suffer disproportionately from physical violence. In some situations, civilians are caught in the midst of hostilities between two or more parties undertaking some military objective. This may lead to casualties among the civilian populations who have been unsuccessful in avoiding the hostilities taking place where they are living or gathered. Increasingly, however, civilians have become the direct targets of belligerents. They may be targeted by rebel groups that are looking to resupply or are interested in forcibly conscripting locals into their ranks. They may be targeted by groups wishing to achieve some psychological impact on a particular people, including through the use of sexual violence. In some cases, they may even be targeted by elements of the armed forces from the very government whose job it is to protect these civilians. Whatever the motivation, attacks on civilian populations have increased at an alarming rate over the past two decades.

Incidents in which civilians come under threat of physical violence can materialize rapidly and without warning and can degenerate into crisis situations with tremendous speed. These crisis situations can present enormous challenges for large peacekeeping operations, which often lack critical mobility assets required to respond quickly and decisively. Frequently, by the time a mission becomes aware that a protection of civilians crisis is unfolding, it may be too late to save lives or to intervene. For these reasons, the United Nations has been putting tremendous effort into developing policy, guidelines, and training for its peacekeepers, with the objective of helping them to prevent protection of civilians crises from arising in the first place. Rather than being forced to respond to crisis situations in which the lives of civilians may be at risk, peacekeeping operations with protection of civilians mandates are putting increasing focus on prevention, which is ultimately the best form of protection.

Analyzing Threats and Vulnerabilities

In order to prevent civilian crises from arising, peacekeeping operations must have a strong understanding of the threats and vulnerabilities of the civilians they are mandated to protect. While this would seem obvious, it is in fact an extremely challenging undertaking in the countries where missions work; these countries often have vast territory over which civilian populations are thinly spread, unforgiving terrain that makes ground movement extremely difficult, and undisciplined armed groups roaming the area with diverse and unsavory motives.

Understanding the various threats that civilians in a particular area may face, and their vulnerabilities to those threats, requires a sustained focus on situational awareness. Peacekeeping operations must utilize all of the tools at their disposal to obtain a comprehensive picture of the situation on the ground and analyze how the various factors that pertain may affect the physical security of the civilian population. The tools that peacekeepers can use to achieve greater situational awareness range from face-to-face communication with the local population to more advanced applications of technology that use satellite imagery to track potential perpetrators or map hot spots.

In any case, determining threats and vulnerabilities to civilians is a multidisciplinary effort involving the work of all components—military, civilian, and police alike. The military component, for example, can gain an understanding of the types of threats that civilians in its area of responsibility may face through its contacts with its counterparts in the national military structure, through talking to local populations during routine patrols, and through monitoring the movements of armed groups in the area. Likewise, United Nations police officers, who are often stationed in or near camps for refugees or internally displaced persons, can track the types of incidents that civilians in their areas have been facing. Civilians working in the operation, such as civil affairs officers, generally have strong contacts with the local authorities, who themselves have an intimate knowledge of the security issues facing civilians.

When peacekeepers have good situational awareness, they can prioritize the threats to civilians they wish to address. This prioritization will be based upon the likelihood that the threat will materialize, the types of violence the civilians may face, and the number of civilians likely to encounter the particular threat, among other things. Making decisions on which civilians to protect can be an extremely challenging endeavor, in both operational and moral terms, but protecting civilians must be undertaken on the basis of a strong understanding of the threat landscape and a corresponding analysis of how those threats are likely to affect civilians.

Managing Protection Crises Once They Arise

Often, in spite of a peacekeeping operation's best efforts, protection of civilians incidents can arise without warning, or without sufficient time for the mission to react in a way that would eliminate the possibility of the loss of civilian life. In extreme cases, these incidents can degenerate into major crisis situations, where the risk to civilian lives can climb to alarming proportions. Although every situation requires a different response, oriented to the particular circumstances, there are certain elements of addressing protection of civilians crises that are essential for peacekeeping operations to engender.

Most important, the response to a protection of civilians crisis must be a whole-of-mission effort. By the time a situation has escalated to crisis proportions, in which civilians are already being killed, military intervention from a peacekeeping operation alone will likely not be sufficient to bring it under control. While a show of force from the United Nations is an important deterrent measure, missions must also use the political levers at their disposal to deescalate the violence.

Critical in this respect is the political advocacy of the head of mission, usually designated as a special representative of the secretary-general, who must work with her or his government counterparts to call for a halt to the violence. This can be an extremely difficult task for the special representative. It is not infrequent for groups affiliated with the government to be involved in the violence in some way, however oblique. In situations in which those groups may have helped the government to come to power or fend off a putsch, the government may be less willing to discourage them from engaging in violence, much less threaten to hold them to account for any crimes committed during the violence.

In other cases, the host government simply may have the will to respond, but may lack the capacity to do so in a timely or efficient manner. In the contexts in which peacekeeping operations are deployed, governments are often in the process of rebuilding and are focused on the most basic governmental operations as they put in place the national, state, and municipal infrastructure. In these situations, missions are sometimes required to act independently to protect civilians. In others, peacekeeping operations can provide important support to their government counterparts to address protection of civilians crises.

Protecting Civilians in South Sudan

The response of the United Nations Mission in South Sudan (UNMISS) to a protection of civilians crisis in Jonglei, in what is now South Sudan, that began in late 2010 and unfolded over the first half of 2011, is a good illustration of how a peacekeeping operation can effectively engage the government to protect its civilian population.

In late 2010, members of the Murle tribe conducted a number of small-scale raids against the Lou Nuer tribe, during which hundreds of cattle were stolen, dozens of people killed, and several women and children abducted. Tension mounted in the Lou Nuer community, who sought revenge for what they viewed as Murle aggression, as well as the government's failure to protect them. More than 1,000 Lou Nuer attackers organized and marched into Murle territory, burning villages and killing hundreds. Murle raiders then launched an attack on a string of villages in Lou Nuer territory, including a village home to a Lou Nuer "prophet" who was accused of organizing many of the raids.

The mission recognized the likelihood of a reprisal attack by the Lou Nuer and took action to prevent further violence. This took place along multiple tracks, including political action by the special representative of the secretary-general, who lobbied the government to recognize the scale of the issue and take appropriate action. For its part, the mission deployed a number of integrated (military, police, and civilian) teams to hard-to-reach areas to gather information, and sent multiple air reconnaissance flights to survey the landscape from above and determine the position of forces on the move. As it became clear that an attack was imminent, UNMISS also deployed a number of military units to the area to deter the attackers.

From the outset, the mission recognized that it alone could not hope to prevent another attack. The number of attackers involved would likely be too large, and the area too vast, and the primary protection responsibility belonged to the government. However, the government's military and police forces lacked the logistical capacity to move across Jonglei's swampy terrain (South Sudan is home to some of the world's largest floodplains). The mission's military and police, along with the South Sudan Armed Forces and South Sudan police, developed a plan to deploy government military and police at strategic crossing points between Lou Nuer and Murle territory. The mission supported the logistical deployment of government forces to these areas so that they could respond.

Given the range of challenges in addressing this crisis (UNMISS was a new mission and only deployed at a fraction of its mandated strength, the number of Lou Nuer attackers that eventually marched on Murle territory grew to around 5,000 people, air assets were limited, the overland terrain was extremely difficult, etc.), additional civilian casualties did occur. UNMISS's action, however, in conjunction with the government of South Sudan, was able to provide a degree of protection for civilians caught in the fighting. Additional civilian lives would undoubtedly have been lost had the mission not undertaken a number of concerted, multidimensional efforts in support of its mandate to protect civilians from the imminent threat of physical violence. The mission's response to this crisis provides a good example of how all of the tools at a peacekeeping operation's disposal can be leveraged to protect civilians, notwithstanding the massive challenges that it inevitably faces in this endeavor.

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See Also: Arms Control; Border Disputes; Catholic Relief Services; Civil War; Civilian Protection; Doctors Without Borders; Ethnic Cleansing; Failed States; Foreign Policy Crises; International Children's Fund, UN (UNICEF); Interstate War; Nongovernmental Organizations; Office for the Coordination of Humanitarian Affairs, UN (OCHA); Peacekeeping; Red Cross and Red Crescent; Religious Violence; Scapegoating; Vulnerable Populations; War Crimes.

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Classification of Systems

A system is an organized collection or arrangement of elements that control and distribute resources such as energy and information in order to achieve some result. Systems generally involve multiple inputs and outputs, may involve feedback loops, and, in general, are resistant to simple, linear solutions to problems. In the last 50 years, systems thinking has become common in many professions, from basic science to applied engineering, and professions such as systems design and systems analysis have been developed to meet this need. Systems thinking is particularly useful when trying to understand the workings of complex processes, whether they relate to the economic functioning of a country, the operation of a hospital, or the functioning of a business, when decisions must take into account the interactions of many separate systems and when the consequences of a single action may be felt across many systems.

Different Ways to Classify Systems

There are many different ways to classify systems: open versus closed, static versus dynamic, natural versus human-made, etc. Of course, a system may be classified along several dimensions, and few systems created by people are purely one type of system only, but thinking through the different types of systems involved in any enterprise can help develop plans for operations, including plans to respond to emergency or disaster situations.

A closed system has no significant interactions with its environment; one example is a chemical reaction in a closed glass container. The results of interactions within a closed system are deterministic and can be predicted from initial conditions. An open system, in contrast, interacts with its environment, allowing information, matter, and energy to cross its boundaries; examples of open systems include business organizations, ecological systems, and plants. A static system such as a bridge has structure but not activity, while a dynamic system such as a school has both structure and activity. Of course, any system is static only in a limited frame of reference: although a bridge does not move, it is constructed and will break down over time, both dynamic processes; in addition, it may be deliberately altered or maintained, both dynamic processes.

Natural systems are created through natural processes and have a high degree of order and equilibrium; examples include the food chain and the natural water cycle. Elements within a natural system adapt to their environment and to events within it, and materials are continually recirculated; natural systems survive if they adapt to changes in the environment; those that do not become extinct. Human-made systems are relatively recent in origin, as the rapid development of technology has multiplied the impact of modern humans on the environment. Human-made systems often produce unintended consequences; for instance, the construction of the High Aswan Dam on the Nile River achieved its goals of producing hydroelectricity and controlling flooding, but also produced negative, unanticipated consequences, including harming the fishing industry, increasing erosion in the Nile Delta, and fostering epidemics of bilharzia along the Nile. A systems view would have taken into account the side effects of the dam's creation and might have come up with a better solution or mitigated the problems.

Classification of Systems for Recovery

The normal functioning of any organization may be disrupted for any number of reasons, including natural disasters (e.g., a flood or tornado), equipment failures, human error, and acts of malice (e.g., computer hacking, arson). The key to a successful disaster recovery plan is focusing on how to best resume normal activities after the disruption and making preparations to respond to the common elements in how any disruption might affect the unit (e.g., loss of information, loss of equipment, loss of personnel), rather than creating a separate plan for each type of potential disruption.

One type of classification that is useful when planning for or responding to an emergency or disaster situation is the classification of systems as critical, essential, necessary, or desirable. Going through the process of classifying the systems in any enterprise, whether it is a business or a relief effort, helps set priorities so that effort and resources can be directed efficiently and the most important systems restored first.

To take a practical example, Michigan State University has published guidelines to assist different units of the university in developing a continuity of operations plan (COOP) as a tool in planning for and responding to disasters or incidents that severely disrupt normal operations. Part of the process of creating a disaster recovery plan for a unit is conducting an impact analysis for all functions of the unit, based on their criticality. Activities are classified according to the time they can remain interrupted: "critical" activities can remain disrupted for less than one day, "essential" activities can remain interrupted for two to four days, "necessary" activities can remain disrupted for five to seven days, and "desirable" activities can remain interrupted for 10 days or longer.

Functions of each unit are also classified in three other ways. First, they are classified according to whether they depend on the availability of specific resources of the university (e.g., the mainframe computer system, the telephone network, paper records) and their degree of dependency on each resource (high, medium, or low). Second, systems are also classified in terms of what would be impacted if they were not performed: human life, federal funding, students, operating efficiency, laws broken, and reputation. Finally, for systems that generate revenue or receive external funding (e.g., federal grants), it must be specified how much and which revenue would be lost were the function not performed for different time periods (1 hour, 1 day, 2 days, 3 days, 1 week, 1 month) and how much additional cost would be incurred if the function were not performed for each time period (e.g., loss of funding, fines). Finally, functions are ranked numerically, with critical functions receiving a score of 1 (i.e., they should be the first priority), essential functions a score of 2, necessary functions a score of 3, and desirable functions a score of 4 (i.e., they are the last priority).

Susan Snedaker provides a system for classifying systems within a company, using similar categories as those provided in the Michigan State guidelines. In Snedaker's system, a category 1 or "critical" system is mission critical, meaning that the system must be present for the company to remain in business, and the goal to restore this system to functioning following a disaster would be expressed in hours rather than days. A category 2 system is considered "essential," not so much for immediate functioning as for long-term operations; for instance, in a business the payroll system might be classified as essential. Category 3 or "important" functions are required for the business to function at top efficiency and would disrupt the business if they were lost for days or weeks, but are not so critical to be restored immediately; examples might include e-mail and Internet access. Category 4 or "minor" functions will not be missed in the short term, although they may make it easier for the business to deal with some relatively small issues; the process of classifying systems for disaster planning may also identify minor functions that are no longer needed by the business and can be dropped.

The Health and Human Services Disaster Recover Leadership Network for Pinellas County (western Florida) provides guidelines for health and human services providers to prepare for a disaster; their focus is on preparing so that high-priority human services (including the provision of shelter, food, and medical assistance) will be available as soon as possible after such a disaster. Although the terminology is sometimes different, the approach to planning is similar to that recommended in the two classification systems already discussed—list the functions provided by an agency or provider, evaluate them in terms of the consequences if they were not performed, and prioritize them so that after a disaster, resources can be directed to the functions that are most immediately critical.

The first step in the network's guidelines is to conduct a vulnerability analysis, dividing vulnerabilities into three categories: impact on humans (including staff, clients, and community reputation), impact on property (including records and electronic databases as well as physical facilities and supplies), and impact on agency operation (likelihood of essential functions being performed following a disaster; for example, if electricity were shut off or normal means of transportation were not available). Vulnerabilities can exist in six major categories: location (e.g., access to major roads and bridges), finances (e.g., fluidity of cash flow, availability of additional emergency funds), communications (e.g., phone network, emergency communications equipment), facility (e.g., conditions of buildings, availability of space to shelter staff and/or others), daily resources (e.g., vehicles, computer equipment), and disaster resources (e.g., availability of generators, number of staff trained in first aid and CPR).

To assist an organization in identifying vulnerabilities, the network suggests using a worksheet in which different threats (e.g., hurricane, cyber attack, terrorism, disease epidemic) are evaluated in terms of the impact on humans, property, and operations, and the strength of internal and external resources to respond to the threat. The degree of impact is quantified on a scale from 1 to 5, with higher numbers signifying more impact; for instance, 1 is described as "minor; agency operations not affected," while 5 is described as "catastrophic; critical systems off-line for extended period; data lost or irreparably corrupted; public health and safety affected." The strength of resources available is also evaluated on a scale from 1 to 5, with 1 signifying that resources are strong and easily available and 5 signifying resources are weak and difficult to find even outside the disaster area. The totals for each type of disaster are summed, and higher totals indicate greater vulnerability.

The network also provides guidelines for classifying functions in terms of “essential” or “not essential”; essential functions include providing food, water, information, counseling, clothing, shelter, and medical care. Agencies then make a list of essential functions, prioritized to indicate which functions should be restored within 24 hours, which within one week, and which within one month. To determine which functions are most important to restore quickly, the network provides a series of questions addressing the consequences if that function were *not* restored within the specified time period, the probability that demand for that function will increase following a disaster (for instance, the need for temporary shelter would be expected to increase after a tornado), which resources would be needed to sustain a given function, and whether less essential functions could be suspended or moved in order to concentrate on more essential functions.

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See Also: Contingency Planning; Critical Business Functions; Decision Making Under Stress; Disaster Assessment; Disaster Recovery; Operational Readiness.

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Climate Change Adaptation

Climate change adaptation refers to the need to adapt to the future climatic conditions that will affect all regions of the world in order to minimize the impact of disasters associated with climate change. Ever since Earth formed 4.4 billion years ago, climate change has occurred. Several factors contribute to climate change, including the distribution of the continental plates, height of mountains, and cyclic changes in Earth’s orbit around the sun. Natural mechanisms have contributed to climate change during the Quaternary Period (roughly the last 2.4 million years), with particular scientific interest in the Holocene epoch (the last 12,000 years).

Human (anthropogenic) activities are contributing to climate change, such as vehicle emissions, industrial plants, and land use practices. However, adaptive strategies can be employed to prepare for future climate change. The Norse settlement of Greenland during the Medieval Warm Period (MWP) and later abandonment following the onset of the Little Ice Age (LIA) provides an example of past adaptation to climate change in the Arctic.

Combined, natural and anthropogenic forcing mechanisms of climate change are placing people at great risk from climate-induced disasters. Historically, the majority of natural disasters are caused by climate-related events: hailstorms, snowstorms, extreme cold, tornadoes, hurricanes and typhoons, monsoon rains, heavy rains, high winds, avalanches, rock slides, mudslides, drought, wildfires, and infestation by vectors (insects). With climate change, many of these types of events will occur with greater frequency and intensity, placing the lives of people who live in areas impacted by these disasters at increasing risk.

Coastal flooding in Narragansett, Rhode Island, April 2007. Increases in atmospheric carbon dioxide are projected to cause Earth to warm by 6.1 degrees C from now to between 2060 and 2090, similar to the last interglacial period, between 125,000 and 115,000 years ago. That period experienced a significant sea level rise, one of the concerns of scientists who predict adverse effects of climate change. A similar sea-level rise in the coming years would cause severe flooding of coastal cities and even submerge low-lying islands.

Celestial Mechanics

The astronomical theory developed by Milutin Milankovitch in the early 1900s is widely accepted by climate scientists as the best theory for explaining changes in the seasons, as well as climate change over hundreds of thousands of years. Milankovitch identified seasonal and longer-term systematic variations in Earth's orbit around the sun based on meticulous measurements of the positions of stars and equations that explained how the gravitational pull of other planets and stars affected Earth's orbit. Through his calculations, Milankovitch identified three primary celestial mechanisms that affect long-term cycles of cooling and warming on Earth, including eccentricity, precession of the equinox, and obliquity.

Eccentricity refers to a systematic shift in Earth's orbit around the sun from an ellipse to a circular pattern and back to an ellipse every 95,000 to 136,000 years, averaging 100,000 years. When Earth's orbit is circular, its distance from the sun is relatively steady throughout the year, minimizing extreme seasonal variation. When Earth's orbit is eccentric, seasonal variation in temperature is more extreme. In an eccentric orbit, the Earth is closest to the sun at perihelion and farthest from the sun at aphelion. If perihelion occurs during Northern Hemisphere's summer, this accentuates the length and intensity of the summer season. If aphelion occurs during Northern Hemisphere's summer, the season is shorter and less intense.

Precession refers to a wobble of the Earth in its orbital path around the sun that occurs every 19,000 to 23,000 years. This wobble affects the point when Earth's orbit is nearest the sun (the location of perihelion) and shifts from the Northern to the Southern Hemisphere approximately every 9,500 to 11,500 years. Obliquity refers to cyclic changes in the angle of the Earth relative to its rotational axis around the sun. The obliquity varies over a roughly 41,000-year period from 22 degrees to 24 degrees, 6 minutes. Changes in Earth's axial tilt result in cyclic changes in the length and intensity of the seasons.

Case Study: The Norse Settlement and Abandonment of Greenland

Multiple lines of evidence (historical documents and archaeological records) indicate the Norse settled Greenland around 985 c.e., during the MWP when the Arctic was warmer than present. Although there is still some dispute about the geographic extent of warming associated with the MWP, most scholars agree that North Atlantic water was approximately 1.8 degrees F (1 degree C) warmer than present for the period spanning ca. 900 to 1250 c.e. The warmer water melted the northern ice packs, making the North Atlantic easier and safer for exploration and navigation.

In their synthesis of Icelandic and Norwegian historical documents, Paul Buckland and his coauthors found documentation indicating that Norse farmers first settled Einarsfjörður, the modern area of Igalikup Kangerlua, located in the extreme southeastern reaches of Greenland, in roughly 985 c.e. Norse settlement of Greenland was led by a Viking explorer commonly known as Eric the Red.

The landscape of Greenland is harsh, and the climate harsher. To survive, it was essential for the Norse settlers to adapt to the severe climatic conditions of the region by modifying the landscape so that it would support crops, and to rely increasingly on sea mammals for protein. The Norse needed to grow enough hay during the short summers to feed their cattle, sheep, and goats through the long, cold winters. The feed needed to be of adequate quality to keep the livestock healthy enough to breed successfully and to provide milk, meat, and hides to the settlers. According to archaeological investigations, to grow adequate crops for their livestock, the Norse implemented agricultural technologies that had been used in their homeland of Norway. They cleared the land of native vegetation, developed water control projects with dams and irrigation networks, and fertilized the soils by spreading a combination of human and animal waste on the fields.

Despite the agricultural ingenuity of the Norse, the harsh climate of Greenland required additional adaptive measures be adopted. Faunal remains recovered from archaeological sites show a dependence on caribou, fish, and sea mammals to supplement the farm diet. Chemical analyses of the skeletal remains of buried Norsemen indicate that during the MWP, the Norse modified their diets to become less reliant on livestock and crops and to become more reliant on fish and sea mammals. The skeletal studies indicate that during the initial period of Norse settlement, marine sources provided 20 percent of the diet. During the final decades of Norse settlement, marine sources provided 80 percent of the diet. The change in diet is in part attributed to degradation of the land and loss of arable land to sea level rise (geologic evidence indicates that for the past 3,000 years, Greenland has been rapidly subsiding). Susanne Lassen and coauthors speculate that the Norse became increasingly dependent on marine animals because the climatic conditions were conducive to supporting a strong population of seals. Through their examination of marine plankton in sediment cores recovered from the Arctic Ocean, Lassen and colleagues determined that there were high wind conditions later in the MWP, which resulted in mixing of the near-shore surface water, which increased nutrients needed to support fish and marine mammals.

Lassen and coauthors also speculate that high winds during the late MWP kept the Norse from developing an economy that relied almost exclusively on intensive fishing of the fjords. The increased winds would have made the seas more treacherous, increasing the risk of losing or damaging boats and potentially resulting in the loss of fishermen's lives. In contrast, seal hunting could be undertaken onshore or near shore and thus posed less risk to the boats and lives of the Norse, and hence this is the strategy they adopted.

Although the timing of the demise of Norse settlement on Greenland is uncertain, historical documents and the archaeological record indicate the land was abandoned in the early 1400s. Many scientists and historians speculate that abandonment occurred as a result of increasingly colder and harsher conditions, as well as a return of sea ice to the fjords. Paleoenvironmental reconstructions indicate that by 1450 c.e. there was a significant increase in sea ice and a marked reduction in the marine food supply. These conditions, combined with a loss of arable land due to subsidence, would have made survival on Greenland extremely difficult. Although historical, social, and political factors also likely contributed to the Norse abandonment of Greenland, paleoenvironmental and archaeological evidence indicates that a rapidly cooling climate, increased sea ice, and a reduction in available marine resources were important factors contributing to the Norse abandoning Greenland.

Solar Cycles

Solar cycles refer to changes in the number and intensity of sunspots, which are caused by the differential rotation of the sun. According to David Hathaway, the sun's poles rotate slower than the sun's equator, causing its magnetic field to become distorted and twisted over a period of years. Distorted magnetic lines within the sun twist like rubber bands and eventually break through the visible surface of the sun and are commonly referred to as sunspots.

The number of sunspots observed on the sun's surface varies from year to year, following an 11-year cycle referred to as the Schwabe cycle. A 22-year cycle is referred to as the Hale cycle. There are also lower-amplitude cycles referred to as Grand Maxima and Grand Minima. These cycles may range from 70 to 300 years and are believed to have affected some of the more significant short-term climate cycles on Earth. For example, the MWP (ca. 950–1250 C.E.), is believed to have been caused by a Grand Maxima cycle. In contrast, the LIA (ca. 1450–1850 C.E.) is believed to have been caused by a Grand Minima cycle.

The impacts of the MWP and LIA on people were considerable, causing changes in where agriculture could be practiced, as well as changes to the fishing industry and other economic activities. Since around 1900 C.E., the amplitude of the sunspot cycle has been higher than it was for the preceding five centuries, indicating that the sun is now in a Grand Maxima cycle similar to the MWP. Today, however, unlike the MWP, human activities are accentuating climate change and making future climate conditions more unpredictable.

Anthropogenic Causes of Climate Change

For several years, many scientists have argued that greenhouse gases (GHG) from anthropogenic emissions (e.g., industry and vehicles) and land use practices (e.g., deforestation and agriculture) have contributed to climate change during the past century. To better understand how people affect climate, in 1988 the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) formed the Intergovernmental Panel on Climate Change (IPCC). This organization was formed to review and summarize climate studies that analyze the effects of anthropogenic GHG emissions, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and various chlorofluorocarbons (CFCs), and human land use on climate change.

The IPCC reports indicate that anthropogenic emissions of CO_2 are increasing the percentage of CO_2 in the atmosphere. To understand how this increase in CO_2 will affect future climate, the IPCC developed climate models. Although the IPCC climate models have not yet been perfected, these increases in CO_2 are projected to cause Earth to warm by up to 6.1 degrees C from now until between 2060 and 2090. Warming of this magnitude is similar to conditions that occurred during the last interglacial period, between 125,000 and 115,000 years ago. Sea level during this period was approximately 5 meters (16 feet) higher than at present—a level that would result in devastating flooding of major coastal cities and the complete inundation of low-lying islands.

In addition to direct impacts on coastal cities, estuaries, beaches, and cultural sites, warming of the magnitude predicted by the IPCC has the potential to effect changes in atmospheric and oceanic circulation, resulting in more intense storms in some regions and drought in others. Changes in atmospheric and oceanic circulation will also affect the distribution of arable lands and the distribution of shellfish, fish, and other marine organisms that people rely upon for food. The IPCC panel predicts devastating effects to the world economy as a result of stresses to global food and potable water supplies, and social and political stresses associated with the need to relocate millions of people from coastal communities and low-lying islands.

Conclusion

Climate change poses a significant threat to human populations worldwide. Studies of past climate change clearly indicate that cycles of warming and cooling are driven by driven by natural forcing mechanisms. The amplitude, timing, and extent of natural climate change to a large degree are driven by changes in Earth's orbit around the sun and changes in the intensity and duration of sunspot cycles. For generations, people have adapted to climate change by adopting new technologies, moving to newly opened landscapes after glaciers retreated, and moving from areas that were no longer habitable due to any number of factors (e.g., prolonged drought, glacial advances, sea level rise). The case study on the Norse, included in this article, provides an example of how humans have adapted to climate change in the past. The Norse migrated to Greenland during the MWP, a period when the Northern Hemisphere was as warm as or warmer than present, and the arctic seas were open for exploration. At the onset of the LIA, they left Greenland because they could no longer sustain their families.

Current climate change in many ways replicates the conditions of the MWP. Whether current conditions are being driven by anthropogenic or natural forces is still debated among scientists, but most scientists agree that climate is changing. People can perhaps learn from the Norse, that flexibility may be required to adapt to the shifting landscape—although we may live along beautiful coastlines now, in the future these coastlines may be inundated by seawater. To adapt, we must move or build barricades to keep the sea at bay. The key to adaptation, however, is understanding how climate change may impact an area in the future and recognizing the power of nature and the need to adapt to its forces.

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See Also: All-Hazards; Avalanches and Landslides; Blizzards; Deforestation; Disaster, Definition of; Drought; Floods; Wildfire.

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Cluster

The word *cluster* stands for congregation, or grouping of people or organizations coming together around a specific interest to be fulfilled in a joint manner. Considering this definition, the word *cluster* in disaster and crisis management refers to a field of specialization around which multiple actors (governments, international nongovernmental organizations (INGOs), the International Federation of Red Crosses and the Red Crescent Movement, and the United Nations (UN) agencies) operate. The idea of operating in a joint manner in both disasters and complex emergencies by unifying efforts, resources, and expertise is known as the cluster approach.

Background, Aim, and Scope

The cluster approach is one of the fields of intervention that came about as a result of reform in the humanitarian sector in 2005 by the Inter-Agency Standing Committee (IASC). In particular, IASC—together with other organizations—decided to implement a mechanism through which international and national agencies could improve their response to disasters and complex emergencies in support of the affected governments. Past experience, such as the 2004 and 2005 Darfur crisis, in conjunction with the evaluation of the humanitarian response, carried out by the Humanitarian Response Review (HRR) on the behalf of the emergency response coordinator (ERC), highlighted the inadequacies of collaborative efforts in certain sectors (shelter, water and sanitation, etc.). Thus, the aim of the cluster approach is to improve preparedness, avoid duplication of efforts, improve the accountability and the quality of humanitarian services, better coordinate the efforts of the humanitarian sector, and strengthen its predictability.

Preparedness refers to the ability of the international system to respond to more than one emergency per year. For instance, IASC established that each cluster should be able to respond to three emergencies per year, two of them happening simultaneously, with provisions of service for 500,000 beneficiaries. One of the most important characteristics of the cluster approach is predictability. Predictability refers to the ability of the cluster to fill the gaps in the humanitarian sector at a global as well as at a country level. One important characteristic of the cluster is that of being a "provider of last resort." This means that when there are gaps that cannot be filled by the entire international community, the cluster lead will step in to take care of it. If this is not possible due to a lack of financial resources, the cluster lead is still obliged to make an appeal to meet the specific need. Thus, the strategic relevance of the cluster approach is that it favors collaboration, making cluster members equal partners. In the past, strategic response in emergencies was based on a first-come, first-served basis; now the system is aimed at improving predictability.

Cluster Structures

The cluster approach consists of nine clusters created on the basis of identified needs and, therefore, services to be provided. In particular, the identification of specific clusters/sectors over others has been done on the basis of those sectors experiencing difficulties in coordination and accountability. Sectors at a satisfactory level of accountability and coordination have already been achieved, such as the agriculture sector, led by the Food and Agriculture Organization of the United Nations (FAO); the food sector, led by the World Food Program (WFP); the education sector, led by the United Nations International Children's Fund (UNICEF); and refugee welfare, led by the United Nations High Commissioner for Refugees (UNHCR). These are not included in the global cluster.

Clusters can be grouped into three main areas: technical, cross-cutting, and common services. Each cluster is paired with an agency that is the cluster leader. The cluster or sector lead does not necessarily have to be assigned to a UN agency and can be entrusted to any organization. For instance, the International Federation of Red Cross (IFRC) shares the lead of the emergency shelter cluster with UNHCR. The IFRC leads the cluster in case of natural disaster and the UNHCR leads in case of conflicts. The following is a list of areas and related clusters:

1. Technical areas:
   - » Nutrition (UNICEF)
   - » Health (WHO)
   - » Water/sanitation (UNICEF)
   - » Emergency shelter (UNHCR for conflicts); in case of natural disaster (IFRC).
2. Cross-cutting areas:
   - » Camp coordination and management (UNHCR for conflicts; IOM for natural disasters)
   - » Protection (UNHCR for conflicts; UNHCR/OHCR/UNICEF in case of natural disasters)

    - Early recovery (UNDP)
3. Common service areas:
    - Logistics (WFP)
    - Emergency communications (OCHA/UNICEF/WFP)

The cluster approach operates at two levels: global and local/country level. The above list of clusters is generally transposed at a local level as well. Global and local/country-level clusters fulfill different tasks. At the global level, the cluster works to build global capacity; at the country level, it is focused on building relationships with local actors, such as governments, NGOs, grassroots, and citizens.

In particular, the global cluster lead covers three main areas: standards and policy setting, building response capacity, and operational support. The global cluster lead's work within the area of standards and policy setting is related to the development or improvement of standards and their dissemination. Response capacity is achieved through maintaining surge capacity, standby rosters, and material stockpiles. Finally, the global cluster leads are also responsible for the provision of operational support, a task accomplished through long-term planning; human, financial, and capacity needs assessment; and advocacy.

Country cluster leads are tasked with information management and operational support of the coordination mechanisms, which are implemented through the 3Ws: who, what, and where. The creation of such a mechanism makes the identification of organizations and of the structures of the whole response system easier. At the country level, it is important to understand who takes the lead for each sector.

In term of accountability, the global cluster leads report to the emergency response coordinator (ERC) operating through the Office for the Coordination of Humanitarian Affairs (OCHA). All the clusters are directly accountable to the humanitarian coordinator (HC), who in turn is accountable to the ERC. The only exception to this system of accountability is the IFRC, which is a "convener" rather than a cluster lead.

Cluster Activation and Closeout

The activation of the clusters occurs when the emergency and complexity of an event require the intervention of multiple international organizations, gaps in the humanitarian needs pointed out by governments and cluster agencies or as a result of consultation among the resident and humanitarian coordinator (RC/HC) and the country team members. Cluster activation is a "six-step process" resulting from consultation among the HC, ERC, cluster leads, hosting governments, and relevant IASC partners at the country level. The humanitarian coordinator provides the ERC with analysis of the gaps and recommends a specific cluster in the country. The ERC then consults with global cluster lead agencies, giving them 24 hours to respond before activation is approved. Subsequently, the ERC informs the IASC of new developments and ensures that appropriate guidance and support are provided. Finally, although there are 11 global clusters, this does not mean that an emergency will require the activation of all of them.

There is no clear guidance on when and how a cluster should end its activities.

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See Also: Food and Agriculture Organization of the United Nations (FAO); International Children's Fund (UNICEF); Office for the Coordination of Humanitarian Affairs (OCHA), UN; Red Cross and Red Crescent; World Health Organization (WHO), UN.

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Cognitive Novelty, Engaging in

There are several pitfalls and saving graces in studying how to engage in cognitive novelty: that is, either the processes by which new and useful ideas are generated or the impression that the situation presented to a decision maker is novel. Particular attention is given to the role of computer-based systems in this process (or, perhaps more precisely, the role of the task and how it is packaged and presented via a computer-based system). There are important perspectives on processes for negotiating the development of the task and its computer implementation.

In crisis management, the need to engage cognitive novelty arises in many situations. In crisis planning, it is frequently desirable to generate unplanned-for scenarios (i.e., highly nonroutine but plausible crisis scenarios) as a prelude to identifying how they may be addressed. Similarly, in crisis response, situations on the ground rarely match exactly those encountered in planning or training exercises. It is therefore desirable for response personnel to be able to generate new and useful ideas—often under tight time constraints. Development of the skills for addressing this need may occur in the field, but also in training situations.

The highly skilled decision maker—whether coming from jazz improvisation, firefighting, or field medicine—is remarkably adept at confounding attempts to draw broad conclusions from his or her novel behaviors. Presented with a novel situation (i.e., one that is not covered by a standard operating procedure), the decision maker may create a new solution, which is then implemented and evaluated. When these solutions are presented to implementers or evaluators to be executed, some degree of learning may be required, in which implementers or evaluators (such as training personnel) attempt to discover how the proposed solution might be executed and validated in the real world. In order to streamline the training process, training programs in crisis management increasingly rely on computer-based systems to provide feedback to trainees, as occurs in gaming simulations.

The inclusion of computer-based systems in training creates considerable challenges when one of the training goals is to engage cognitive novelty. As finite-state machines, computer-based systems are not designed for "out of the box" reasoning. Accordingly, research in cognitive science and artificial intelligence has been concerned with developing computational approaches to interpreting and evaluating novel ideas created by human operators. Similarly, gaming simulations in crisis training are slowly becoming more adaptive and thus capable of generating novel scenarios with little human intervention.

To understand the dynamic tension between human and computer in this context, it is useful to introduce the concept of engagement: participants' utilization of their attention, effort, and knowledge in undertaking the task set before them. The domain of the participants in emergency response operations stirs up some very human dichotomies: heroism/cowardice, life/death, truth/lies—not merely in the general population but also in the participants themselves. It is not unreasonable to expect that systems seeking engagement must reflect designers' understanding of the domain (if not their actual experience in it) if such systems are to be successful.

A process for negotiating the development of the task and its computer implementation may begin with identifying elements of the task, the environment within which it is presented, and the participants that foster engagement. In research on emergency response, for example, time constraint and variable levels of emergency event severity may be highly salient—and thus key elements to include in a simulation. Other possible factors include commitment to decision (i.e., a situation where decisions cannot be "undone"). The environment for delivery of the task may also foster or hinder engagement. Participant background and expectations are likely to dictate, ultimately, whether engagement is achieved. Indeed, it is often worthwhile to examine whether participants are positively inclined to engage the task. Such an assessment may be made by considering whether they view their performance as tied to their feelings of self-efficacy or to other incentives.

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See Also: Decision Making Under Stress; Decision Stream; Decision Support Tools; Improvising.

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Cold Site

A cold site, also known as a "shell site," is a designated standby recovery facility (a warehouse, an empty office building, or a similar construction) large enough to host the mission-critical activities and applications of an organization's primary site. It is essentially a reserved maintained space (raised floors with electricity, air conditioning, humidity controls, fire protection, and pre-installed wiring) ready for the installation of workstations, office equipment, and networking and computer systems that will be shipped in the event of a primary site outage.

As a cold site does not come set up with hardware, software, or backed-up versions of the organization's data, it requires minimal start-up costs. Vendors offer cold site services on an annual subscription fee that includes access to the facility and, in most cases, two one-day disaster recovery tests. Although this is a less expensive site recovery strategy, it should be noted that it also takes some extra time to get the organization's systems up and running after the outage because new systems have to be installed. Normally, the organization should expect full recovery of its work environment within 48 hours from disaster declaration, making this solution more suitable for organizations that can sustain a few days of downtime before business resumption and for those that, following a major disaster, lose their primary site for quite a long time. A further limitation of cold sites is that the testing of the service can become very expensive because it cannot take place unless all equipment and systems are expedited and communications lines installed and configured according to the organization's needs. Equipment and systems must be temporarily rented or leased and then, at the end of the test, returned to their owners. Alternatively, they can be sourced from the primary site, but this solution may cause disruption to the business (unless a test is run on nonworking days, for example, during a weekend) and transportation to and from the cold site increases the risk of damage.

Cold site service vendors may have multiple subscribers contracted to use their sites. In the advent of a widespread disaster, only one of these will be able to relocate in every site. It is therefore important that the organization require the vendor to clearly state in the contract the limits on the number of clients from the same geographical area entitled to use the cold site services offered. The organization may also consider including a "no lockout" clause in the contract, something that, on one hand, will increase the cost of the service but, on the other hand, will guarantee a cold site even in periods of high demand.

An attractive alternative to a cold "shell" site service is the use of mobile sites or "porta-sites." In this scenario, self-contained trailers or other easily relocated units equipped with the appropriate environmental controls, electrical generators, and telecommunication systems are transported to the primary site so that equipment can be obtained and installed near the original location. Business continuity plans should reflect how long it will take for the mobile site to be set up and running in the disaster location and all pre-configurations required for this. The service usually costs the same as a cold site but brings the work environment to the end user, thus saving travel time for the recovery personnel and offering greater flexibility to organizations with multiple sites nationally and internationally. An additional advantage this option offers is that it makes testing more feasible. Mobile sites may also be configured to offer "warm" or "hot" site recovery services.

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See Also: Business Continuity Management; Business Continuity Planning; Business Continuity Planning Life Cycle; Business Resumption Planning; Warm Site.

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Collaboration

Since the 1940s, crisis management has been evolving from a top-down bureaucratic model toward a more collaborative system. One important feature is that, instead of a command or control system, collaboration brings a more dynamic and flexible network model that facilitates multiorganizational, intergovernmental, and intersectoral cooperation. Dynamic and efficient strategies have been adopted in the field of crisis management to replace hierarchy and standard procedures. Another feature is the changed relationship between government, nonprofit organizations. and the private sector. Calls for open communication and broad cooperation dispel the authoritarian air that long hung over the field of crisis management. Nonprofit organizations and the private sector take shared partnership and responsibility along with the government. They support, coordinate, and interact with each other; they also provide and receive information and all types of assistance from each other before, during, and after a disaster.

Collaboration is essential in addressing both natural and human-made disasters. In the management and coordination of disaster preparedness, response, and recovery, governments need to work closely with nonprofit organizations and the private sector. Citizens should also be included in the entire process. The National Fire Protection Association (NFPA) of the United States 1600 and the Emergency Management Accreditation Program (EMAP) standards define emergency management programs as "a jurisdiction-wide system that provides for management and coordination of prevention, mitigation, preparedness, and response and recovery activities for all hazards"(EMAP Standard 3.3.3). The standard also requires an advisory committee to "ensure that the program is developed and maintained in collaboration with program stakeholders, both from policy and operational levels" (EMAP Standard 4.3.2). The president; Congress; federal, state, local agencies; nonprofit organizations; the private sector; and individual citizens are all stakeholders of emergency programs in practice.

Generally, intergovernmental collaboration, public-nonprofit collaboration, and public-private collaboration are the three most usual patterns of collaboration.

Intergovernmental Collaboration

Federal, state, and local agencies share the responsibility of crisis management when facing a disaster. Different levels of governments need to work with each other toward an effective and efficient crisis management system. Interstate collaboration is also necessary in some cases.

Since the 1940s, with the start of the Cold War, the U.S. federal government has been increasingly involved with state governments in crisis management. By that time, the Federal Disaster Act and the Civil Defense Act were passed, and the Federal Civil Defense Administration was established to provide assistance during disasters. Natural and human-made disasters during the 1960s and 1970s, such as the 1964 Alaska earthquake, increased the demands for comprehensive disaster management. Actually, the federal government was not involved in the costly phase of disaster response work until the 1964 Anchorage, Alaska, earthquake. Executive Order 12127 established the Federal Emergency Management Agency (FEMA) comprising several federal agencies, to provide broader disaster management and comprehensive assistance to local communities. For most federal assistance during disasters, a Presidential Disaster Declaration is required, which initiates mechanisms for collaboration and use of all-level government resources. Federal assistance includes individual and public assistance, but mostly it serves as a source of funding. In some cases, federal departments and agencies can provide immediate lifesaving assistance to states without a formal presidential declaration.

State governments usually play the role of intermediaries. They assist in federal policy implementation, local community training, and federal grant funneling. The state's governor's declaration is also required for federal assistance, according to the Stafford Act.

Although the federal government provides substantial resources, local agencies still carry the greatest responsibility for disaster management. Disaster preparation and response is widely viewed as the appropriate role of government, and most citizens expect government, especially their local government, to take an active role. At the local level, the department of emergency management plays a key role in disaster management as the main coordinator of all agencies. Sometimes a task force may be set up with officials from local emergency management departments,

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An elderly woman is rescued on May 14, 2008, after being trapped for more than 50 hours in the destruction caused by the 2008 earthquake in Dujiangyan City, Sichuan Province, China. Collaboration was at work in this crisis: Nongovernmental organizations provided assistance to victims and raised $6 billion in aid. Private companies provided free temporary housing, permanent home construction, and cell phones to survivors. Finally, over 75 percent of victims were rescued by mutual aid from local citizens.

related governmental agencies such as the department of health, department of civil affairs, and fire and police departments, as well as representatives of the private and nonprofit sectors. These agencies take on specific tasks in the event of a disaster, from placing road closure signs to providing food, building shelters, and the like.

The 2009 Georgia flood demonstrates a successful intergovernmental collaboration. In September 2009, Georgia experienced historic flooding. Following the emergency, the Governor's State of Emergency Declaration was issued, followed by the Presidential Disaster Declaration. Fourteen counties were qualified for federal assistance. During the disaster, local agencies such as the Georgia Emergency Management Agency, Georgia Department of Community Health, and Georgia Department of Community Affairs played a proactive role in the response and recovery process. A Unified Command System was set up to help coordinate interactions among these agencies with "jurisdictional, geographical, or functional responsibilities" toward joint efforts. For example, firefighters in Taylor County assisted local authorities with road damage assessments. They also assisted the Department of Natural Resources in water rescues in Douglas County and other areas. In addition, Georgia received interstate assistance from North Carolina and Alabama, which provided public assistance coordinators. The successful management of the 2009 Georgia flood is to a great extent attributed to effective and efficient intergovernmental collaboration.

Public–Nonprofit Collaboration

For a long time, people considered natural disasters as "God's action," and disaster preparedness and response were mainly the responsibility of individuals and local communities. However, the disruptive and dynamic nature of disasters often exceeded the capacity of the community level. Multiorganizational responses become essential, especially the collaboration between the government and nonprofit sectors. No single department or agency has sufficient resources to deal with the major disaster at hand.

Developing close working relationships and strong collaboration between governmental emergency management departments and nongovernmental organizations (NGOs) leads to more effective and efficient disaster response and recovery activities. NGOs are agile and less bureaucratic than government agencies; however, NGOs' limitations in resources, accountability, and coordination sometimes undermine their effectiveness and efficiency as well as the equitable distribution of services. Also, donors tend to be interested in immediate disaster relief rather than longer-term recovery and mitigation, so the voluntary sector alone is not capable of both coordinating and guaranteeing a just and effective social response to disasters.

Nonprofit organizations and faith-based organizations (FBOs) have a long history in disaster relief work and collaboration with government agencies in the United States. The history can be traced back to 1905, when the American Red Cross declared to receive the Congressional Charter that asked the American Red Cross to carry on "a system of national and international relief in time of peace and apply the same in mitigating the sufferings caused by pestilence, famine, fire, floods, and other great national calamities, and to devise and carry on measures for preventing the same." The congressional charter still operates today.

The Federal Emergency Management Agency (FEMA), as the main governmental disaster response agency, has a long and close relationship with the National Voluntary Organizations Active in Disaster (NVOAD), which is the main national network of NGOs related to disaster activities. In October 1979, soon after FEMA was established, John Macy, the director of FEMA, met with the NVOAD membership. In response to this meeting, NVOAD appointed a committee to work closely with FEMA on an ongoing basis. Now the relationship has grown to the point that FEMA currently participates actively in NVOAD's board meetings, committee meetings, annual meetings, and the annual VOAD leadership conference. At the national level, the NVOAD offers a forum for communication between the many active voluntary agencies on a wide number of issues. At the regional level, FEMA participates in state VOAD activities and encourages close working relationships. Through these methods, FEMA has developed strong rapport with local and state-level VOADs throughout the country.

Also, FEMA continues to maintain its memoranda of understandings with individual voluntary agencies and works closely with NVOAD members individually. FEMA contributes to the public awareness of NVOAD, contributes to the training of NVOAD and VOAD members, assists NVOAD in helping its members contribute to disaster mitigation, and assists NVOAD in the development of a partnership between its members and the business community. And NVOAD agreed to lead and encourage the mitigation of natural hazard risks through outreach, education, and local community involvement both before and after disaster occurs; encourage linkages between governments, the business community, and the state and substate VOADs; assist FEMA when a major disaster or emergency is declared; encourage its members to regularly share information about field disaster response and recovery activities with FEMA regional offices; and disseminate FEMA emergency management information through its membership.

NGOs play a vital role before, during, and after a disaster. NGOs have direct contact with the mass population. Their informing of the public and a close relationship with local communities makes it much easier for NGOs to integrate people into disaster preparedness and training. During and after a disaster, NGOs collaborate with first responders, governments at all levels, and other agencies and organizations providing relief services and fund-raising to sustain life, reduce physical and emotional distress, and promote recovery of disaster victims when assistance is not available from other sources. NGOs have their specific target groups with a focus on a certain social problem, and they clearly understand the needs of disadvantaged groups such as the elderly, children, and the disabled. Also, because NGOs provide professional service in daily life, they are more professional and efficient in providing services for victims. For example, in the 9/11 World Trade Center attack in 2001, volunteer psychological organizations provided psychological counseling for emergency responders and victims afterward. In the 2008 Wenchuan earthquake in China's Sichuan province, Save the Children focused on providing assistance to the child victims. Moreover, NGOs play an important role in collecting funding and resources. NGOs have connections with enterprises and governments nationwide and internationally. They can effectively raise money or resources by organizing donation of money, clothes, or food. In the Wenchuan earthquake, NGOs such as the Red Cross raised about $6 billion, which accounted for 31 percent of total funding. What is more, participation of NGOs in disaster management fosters the consolidation of the society and increases people's sense of responsibility.

Public–Private Collaboration

The private sector also plays a key role in every phase of crisis management. Many private-sector organizations are responsible for operating and maintaining the nation's critical infrastructure. Privately owned critical infrastructure, key resources, and other private-sector entities are significant to local, regional, and national economic recovery from incidents. Examples of privately owned infrastructure include transportation, telecommunications, private utilities, financial institutions, and hospitals. Also, many private sectors have their own continuity plans to deal with disasters, which ensure their continuous operation.

Participation of the private sector during a response varies based on the nature of the organization and the nature of the incident. Generally, there are three types of collaboration of the private sector with the government and nonprofit organizations. First, owners of certain regulated facilities or hazardous operations are usually legally responsible for preparing for and preventing incidents from occurring and responding to an incident once it occurs. For example, federal regulations require owners of nuclear power plants to maintain emergency plans and facilities and to perform assessments, prompt notifications, and training for a response to an incident. In the historical snowstorm in South China, electric power companies were required to clean the ice on the power poles to maintain the electricity provided to local communities.

Second, many private-sector companies voluntarily participate in disaster preparedness, mitigation, and recovery for no profit. This embodies the sense of corporate social responsibility (CSR). Nowadays, as the private sector becomes the main fosterer in economic development, it has much more involvement in social development than ever before. Not only does the private sector provide better technology, products, and service to the society, it also relies more and more on the development of the society that provides it with a safe and stable social environment and consumers with affordability. Also, enterprises with a good image among the mass population tend to attract more consumers. This interdependence motivates many private-sector firms to volunteer for disaster response activities. In the Wenchuan earthquake, many companies volunteered to provide free tents and movable shelters for temporary victim housing. The telecommunication company offered free cell phones to survivors to reach out to their relatives. Construction companies promised to rebuild houses for the victims at no charge.

Finally, other private-sector companies participate in disaster management in the form of a paid contract with the government. The contract requires the companies to promise to provide certain products or services to the community once a disaster strikes. The government pays for their expenses. This encourages enterprises to produce or store products specified by the government that are mostly needed by local communities, not only during and after a disaster, but also before a disaster. For example, local government can sign a contract with companies producing extinguishers, fire hammers, and wires. This contract form provides a more agile and efficient model and largely reduces either shortage or waste of necessary resources.

Collaboration With Citizens

Citizens, whether affiliated with a group or independent, are an indispensable part of disaster management collaboration. They have a strong desire to make efforts to increase their safety and that of their families and communities. The mobilization of organizational and individual volunteers also serves a social-psychological purpose in that it brings communities together and gives them a sense of efficacy.

Citizens are always the first responders at the disaster scene—before other assistance such as the military or medical groups arrive. In the Wenchuan earthquake, 70,000 survivors out of 84,000 trapped in the debris or injured were rescued by mutual aid from citizens. Less than 17 percent of the survivors were rescued by professional groups, who arrived hours or days later.

To promote citizens' role in all phases of emergency management, it is necessary for them to receive training in advance. The residents should be educated in disaster procedures and mitigation endeavors. Through this process, they become more self-reliant and supportive of what emergency services can provide.

Achieving Successful Collaboration

Collaboration of varied governmental agencies can be better reached with preestablished frameworks such as mutual aid agreements and memoranda of understanding to provide or receive assistance in disasters. A good example is the Emergency Management Assistance Compact (EMAC), a state-level mutual aid agreement. According to this agreement, states can share resources in the event of a disaster. States that provide assistance can be reimbursed by FEMA for their expenses. For example, FEMA reimbursed more than $30.4 million to the state of Mississippi for receiving more than 24,000 victims from other states in the event of Hurricane Katrina.

Successful collaboration also requires excellent personal skills in leadership and communication of emergency managers. Matching organizations' skills and abilities to the tasks at hand is no less important than matching employees' skills and abilities to their job descriptions. Successful collaboration depends on a clear understanding of each entity's roles and responsibilities in emergency management. Thus, emergency managers must be familiar with the functions and capabilities of all departments, agencies, and organizations at various levels of government as well as of other entities in the private and nonprofit sectors. Emergency managers not only must be aware of the number and diversity of agencies involved in disasters but also must improve their administrative skills and their ability to improvise in cooperation with others. Different organizations have their unique missions and values, different cultures, and running models. Misunderstanding of a key word in disaster management among organizations could cause big trouble. Also, conflict among agencies could greatly lower the efficiency of disaster response activities. Thus, emergency managers need to sharpen their skills in leadership and communication to reach a better collaboration in crisis management.

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See Also: Agency Notification and Mobilization; Business Continuity Planning; Business Continuity Planning Life Cycle; Command and Control; Coordination; Crisis Communications; Disaster Declaration; Disaster Recovery; Emergency Management Agencies, City and County; Emergency Manager; Emergency Responders; Federal Emergency Management Agency (FEMA); Nongovernmental Organizations; Political and Organizational Leadership; Preparedness; Prevention; Public Relations; Red Cross and Red Crescent; Stafford Act; State Emergency Management Agencies; Volunteer Coordination.

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Command and Control

In the context of emergencies, “coordination” means conducting processes and operations so that their functionality is guaranteed, usually by ensuring that people and organizations work together to good effect. The term *command* means giving formal orders and instructions to people and groups so that they will take particular actions. Principles of command and control in civilian emergency management are derived from military practice and reflect the need to ensure that response operations are orderly and disciplined. Systems need to be designed to ensure that the commanders do not lose sight of the “big picture” (i.e., the context of emergency operations). This is achieved by ensuring that command decisions are based on sound procedures, experience, and information relayed from the field of operations.

Emergencies tend to be chaotic situations characterized by the imperative need to limit casualties, destruction, and damage. Data on the evolving crisis may be insufficient, uncertain, and ambiguous, and there may be sudden, unexpected developments to which the response mechanisms must adapt with great rapidity. In crisis situations, emergency managers will probably suffer from stress and tiredness, but they must maintain clear objectives, interact effectively with many people, and communicate lucidly. Emergency response organizations may have shifting, competing goals, yet in managing them, emergency commanders need to be aware of the terrible potential consequences of errors, inefficiency, negligence, or inactivity.

This article considers the nature of emergency command (including changing trends in the modern era). It reviews two models of emergency command (incident command system and the gold-silver-bronze model) and will conclude with some remarks on contemporary challenges in command and control.

Anatomy of Emergency Command

There are two basic models of emergency management that constitute the end members of a spectrum, along which many different permutations are possible. The "command function model" groups the emergency functions around a locus of control, the chain of command, which comprises a hierarchy of tiers determined by decision-making competencies at each level. Typically, the levels are strategic, tactical, and operational. The "support function model" is nonhierarchical and relies more on collaboration than on command. Relationships between emergency managers are based more on specific functional sectors than on position in a hierarchy of decision makers. Examples of the sectors include search and rescue, materials and supplies, logistics, transportation, communications, and shelter. The command function model assumes that the responses of the many organizations that participate in emergency operations need to be centralized and formally directed by a hierarchy of authoritative people. The support function model assumes that a crisis can be managed by allotting competencies to task forces and ensuring that they exchange information adequately and address all needs generated by the emergency. As these are end members of a spectrum, most forms of crisis management that are actually used are less extreme than a purely command-based or purely collaborative approach and thus represent a compromise between models.

In the modern world, emergency conditions favor uncertainty, diversity, informality, and decentralization. Therefore, emergency management means coordinating more than controlling. Moreover, in general terms, everyone wants to command and control, but not everyone is happy to be commanded and controlled. This is evident at the grass-roots level of relief efforts, where decision-making processes tend to be pluralistic and decentralized. At the same time, information and communications technologies have become an important and accepted part of crisis response, and their effect has been to reduce the need for centralized or hierarchical decision making and promote a more collaborative approach. In brief, they have flattened the chain of command.

The modern emergency manager is more a controller of resources than of people. Besides personnel, the resources consist of light and heavy vehicles (possibly including aircraft), specialized equipment, materials and supplies, buildings and structures, and the means of rapid communication. Stated in other terms, the "raw material" of emergency command is made up of structures, things, and tasks.

The choice of management model depends on the forms of public administration that prevail in a particular country, and also on cultural factors. Where autonomy and individualism prevail, a more collaborative model is required; where people are accustomed to waiting for orders, a more command-based model is appropriate. In either case, there will be a "lead agency," either by default or by design. This is the reference organization for basic command in the incident. It will be charged with assuming a coordinating role and presiding over decision processes, above all at the site of emergency operations. The lead agency could be any of the main emergency response organizations, and which of them is chosen depends on both the national culture of emergency response and the problems encountered in typical national emergencies. In Italy, the Fire and Rescue Service is the lead agency, as in major disasters such as earthquakes, firefighters have the lead role in search and rescue and making environments safe for other responders to enter. In Britain, the lead agency is usually the police, because emergencies are seen first and foremost in terms of the need to maintain public order.

Arrangements exist to let the other services take over the lead role in specific kinds of emergency. In the Islamic Republic of Iran, the Red Crescent is usually the lead agency, as earthquake disasters are usually major mass casualty events.

A common emergency management system is the incident command system (ICS), in which the lead agency role is in many cases occupied by a fire service.

Incident Command System

The incident command system (ICS) began with a radical reorganization of wildfire-fighting activities in California after a particularly difficult day in August 1970 when centralized command was unable to cope with almost 200 simultaneous environmental fires. The ICS is a modular system with command instituted at the site of the incident. Emergency operations grow with continuing assessments of needs and the arrival of new resources at the site. The ICS offers a means of coordinating the work of organizations and task forces and ensuring that they strive toward common objectives, such as stabilization of the incident and protection of lives, property, and environments.

At each site there is an incident commander, who provides local leadership and should be the most appropriate person to do so, on the basis of rank, experience, and training. He or she coordinates operations at the scene. A planning officer acts as the point of contact between the incident commander and the organizations that respond to the emergency. He or she collects and evaluates information on the incident, helps the incident commander to define operational priorities, and disseminates information on the progress of the incident and the corresponding operational response plan. The plan is put into action by the ICS operations section. At the same time, the logistics section acquires and manages the materials, equipment, and services required to support the emergency responders. The logistics team follows the instructions of the incident commander and the operations section. At the flank of these workers, a safety officer monitors risks associated with operations at the site and ensures that all emergency responders are properly protected. An information officer liaises with any mass media representatives who are present and ensures that the incident commander can communicate efficiently with the emergency operations center that provides support and backup to the field team. Finally, the accountability and administration section monitors and registers expenditures and manages administrative processes. A simplified diagram of the ICS is shown in Figure 1.

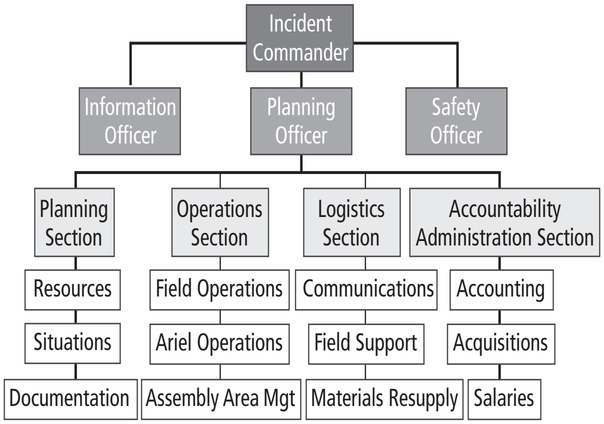

Figure 1 Simplified diagram of an incident command system

In this way, the ICS is designed to ensure that command processes are logical, acceptable, and transparent; that responsibilities for action are fully assigned; and that emergency responders are able to divide up tasks, collaborate, and provide each other with any mutual assistance that may be required. Flexibility is ensured by the fact that on-site command and competencies can be passed instantaneously from one person to another by the mere act of taking off or donning a reflective tabard, and also that the system embodies the delegation of responsibility to individuals, teams, and task forces. Compared with many other forms of command, the ICS has improved information sharing, collaboration, communication, efficient use of resources, and safety and security of responders. It has reduced the span of control and favored realistic forms of management, especially across different organizations (in very large disasters, more than 100 of these may be present in the field).

The ICS is satisfactory when its objectives are clearly defined, reasonable, consistent, and adequately prioritized. Critics of the ICS have argued that it does not function well in large disasters (i.e., that it is inherently suited to small, self-contained emergencies, such as localized transportation crashes or house fires). It is difficult for the system to absorb groups of responders who are independent or poorly organized—the so-called freelancing problem. Critics say that it can cause a large convergence reaction of emergency personnel, equipment, and resources, but it remains too simplistic to manage these, especially over long periods of time. Indeed, it has been argued that the ICS can create inflexibility when conditions change rapidly and unexpectedly. Moreover, the emphasis on "command" could signify authoritarianism. In synthesis, the ICS seems to be least effective when there are rapid, multiple impacts in a limited geographical area, where many organizations seek to achieve many different goals, and where the varied objectives of emergency operations conflict with one another.

The protagonists of the ICS respond that many of its inefficiencies result from failure to train and exercise participants in using the system, or from its application in contexts for which it was not designed. The best conditions for the use of the ICS are those in which there is no lack of trust or leadership, participants know each other and work well together, the tactical plan of action is established before the incident, all participants are well aware of the nature and magnitude of the incident, and there is a good consensus among all the emergency responders. However, one could argue that these are preconditions for good emergency response whatever the command system employed.

Despite reservations about the validity of the ICS, it has been widely adopted since it was devised more than 40 years ago. The U.S. National Incident Management System (NIMS) is a form of ICS designed to be used in national emergencies and embodies a full-scale multiagency coordination system. In the United Kingdom, the Medical Incident Management System (MIMS) is a variant of the ICS designed to codify on-site responses to medical emergencies by health personnel. Outside the United States, applications of the ICS are more commonly limited to particular services than applied to the whole spectrum of emergency response organizations. In Italy, for example, the National Fire and Rescue Service has its own ICS, but this does not extend to the organizations with which it works (police, medical first responders, volunteer groups, etc.).

The British Command and Control System

The national emergency management system in the United Kingdom is hierarchical and based on a tripartite distinction between "bronze" (operational), "silver" (tactical), and "gold" (strategic) levels. In addition, "platinum" (or "diamond") is the policy-setting level, but it is not intended to be activated during emergencies. Instead, the highest level of emergency command is represented by the Cabinet Office Briefing Room (COBRA) in London, which is a sort of higher-level strategic operations center staffed by senior members of the national government.

In an emergency, the bronze level (operations) is activated before the silver and gold levels. The bronze commander must first estimate the geographical size and seriousness of the problem. He or she assigns control of a specific geographical area to a particular commander and begins the process of coordinating organizations that work at the site. Multiple sites thus require multiple bronze command posts and commanders. Silver (tactical) command may be based in an urban center near the incident, in many cases in a local police station. Silver determines priorities in the allocation of resources, plans and coordinates tasks to be carried out at the site or sites, establishes general command over all operations, and maintains a register of decisions and actions taken. The silver commander decides whether to activate the emergency plan and puts into action the measures needed to tackle the incident. At one further remove, gold (strategic) command locates and supplies adequate resource support to tactical commands and forms a group to ensure that multiagency response is adequately coordinated. The flow chart of the system is shown in Figure 2.

It is evident that in this system, "gold" must find resources, "silver" must allocate them, and "bronze" must use them. Functional sectors are distributed among the levels of this hierarchy, with the majority of them pertaining to the strategic level. Indeed, the decision may be taken to institute a parallel "gold media command" so that intensive inquiries by mass media representatives can be answered without interrupting the emergency response chain of command.

Are Command and Control Really Necessary?

It is evident from the description of these two systems that the ICS uses a more collaborative approach and the UK system is oriented more toward a traditional model of military origin. Command and control appear in various forms in both systems, but are they necessary at all? It could be argued that command merely takes away a sense of individual responsibility from whoever is commanded, and that it inhibits creativity and flexibility in the face of complex, intractable, and rapidly mutating problems.

There is no doubt that adaptive management is needed in the modern emergency. Responding adequately is no longer a process of applying the rules and waiting for the results. One must be able rapidly to recognize the magnitude of the event: A state of emergency must be declared at a very early stage in a synchronized way between participating organizations; this will enable them to move from normal operations to emergency response mode in which nonessential tasks are dropped. Above all, there must be good lines of communication between organizations and full sharing of information.

A good leader is a person who has clearly defined responsibilities and is fully aware of them. He or she has previous experience managing emergencies and is well able to carry out the appropriate tasks associated with managing the emergency. He or she is able to balance detachment with involvement, to avoid the decision-making rigidity that goes with tiredness and stress, and to stop burnout from occurring. From the point of view of team members, the leader should satisfy the dual need for a way-finder and a protector. The extent

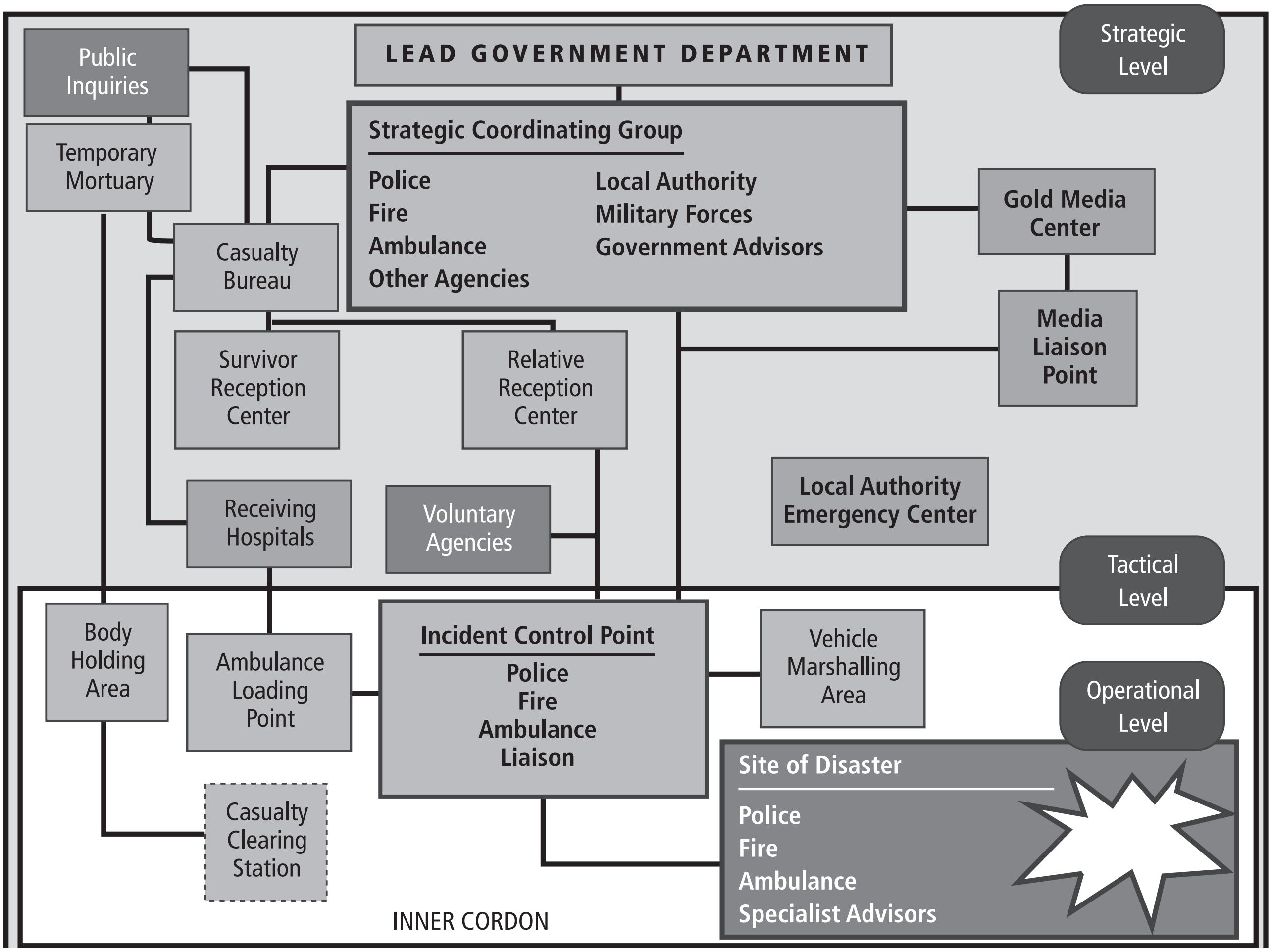
Public Inquiries
LEAD GOVERNMENT DEPARTMENT
Strategic Level
Temporary Mortuary
Strategic Coordinating Group
Police
Fire
Ambulance
Other Agencies
Local Authority
Military Forces
Government Advisors
Gold Media Center
Casualty Bureau
Media Liaison Point
Survivor Reception Center
Relative Reception Center
Local Authority Emergency Center
Receiving Hospitals
Voluntary Agencies
Tactical Level
Body Holding Area
Ambulance Loading Point
Incident Control Point
Police
Fire
Ambulance
Liaison
Vehicle Marshalling Area
Operational Level
Site of Disaster
Police
Fire
Ambulance
Specialist Advisors
Casualty Clearing Station
INNER CORDON

Figure 2 Gold, silver, and bronze (strategic-tactical-operational) command system (United Kingdom model)

to which this involves processes of command and control depends on individual, organizational, regional, and national cultures. Some degree of command and some need to exert authority will always be present, but the current tendency in emergency management is away from authoritarian approaches toward more collaborative ones.

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See Also: Civilian Protection, Post-Conflict; Coordination; Decision Making; Decision Making, Theories of; Decision Making Under Stress; Decision Support Tools; Emergency Management, Principles of; Emergency Management System; Emergency Manager; Interoperability; National Incident Management System (NIMS); Perimeter Control; Political and Organizational Leadership; Volunteer Coordination.

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Commodity Shortages

The most practical definition of a "commodity shortage" is the inability to obtain key items such as articles that can be used for trade. These may include gold, silver, spices, apples, grain, or related items. A commodity shortage may lead to a large crisis secondary to the lack of important supplies such as food or medical supplies. Moreover, communities often face illness due to a lack of simple commodities such as cleaning supplies, soap, or shoes. It is important to note that services are not typically defined as commodities.

Reasons

Commodity shortages are quite common during a crisis. There are several reasons for shortages, including a decrease in production resulting from a lack of materials or manpower, pestilence in the food supply, a lack of transportation assets or routes, or a divergence of supplies to a crisis area. Divergence of supplies to areas stricken by a crisis or affected by military action often reduces the amount of commodities available for the public. Since commodities may be very limited in many areas, this divergence will severely impact the civilian population. Storage concerns are also a major concern. Many nongovernmental organizations (NGOs) provide commodities, especially food, during crises. However, government programs also provide food supplies and other commodities in partnership with NGOs. The military often works with these organizations to ensure that emergency transportation assets are available whenever private resources may not be readily available.

A decrease in production secondary to a lack of raw materials or manpower often occurs during extraordinary events. The most common reasons for a lack of raw materials include reduced production, shuttering production facilities due to crisis, overusing raw materials, or reduced ability to obtain raw materials to produce commodities. Since finished products such as generators, vehicles, or toilet paper cannot be produced without parts or raw materials, production facilities have no choice but to cease production whenever they are unable to obtain raw materials.

Some raw materials such as platinum are so hard to obtain that the world supply is often reduced in an effort to prevent large shortages of the commodity. Other commodities such as medications used to fight cancer or control diabetes are in short supply because production facilities have lost patents, thereby reducing profit margins. These facilities often choose to cease production rather than lose profits. This leaves suppliers trying to find other ways to obtain commodities, which may not be possible. Moreover, the price of the remaining commodities is often so high that only the wealthy can afford to purchase them. The availability of certain commodities may also be secondary to geographical location of those seeking the commodity. For instance, it may be quite easy to obtain a petroleum product, such as diesel, in areas near refineries or where pipelines are readily available, but it may be hard to obtain in areas that require extended shipping methods. Commodity shortages are also common during work stoppages.

Pestilence in the food supply may reduce the availability of fruits, vegetables, and grains. Although chemicals are often used to reduce attacks by these pests, it is quite common for many areas of the world to experience infestations. Farmers in underdeveloped countries do not have access to a ready supply of pesticides or the equipment to deliver them; therefore, these areas of the world are accustomed to infestations. However, many developed countries also experience their own infestations. For instance, both China and Russia have experienced attacks by large swarms of locusts, thereby reducing their food supply. Countries then have to allocate funds to purchase food supplies from countries such as the United States or Brazil.

A lack of transportation assets, such as trucks or ships, may create a commodity shortage. This may be due to poor road conditions, work stoppages, lack of spare parts for repairs, or a lack of trained operators or pilots. Additionally, during a crisis these transportation assets may not be available because they are diverted for use in more critical areas.

Severe weather also limits the number of transportation assets that may be available. For instance, during an ice storm it is not always possible for large trucks to move along roadways because they are impassable. Severe weather also impacts other transportation assets such as aircraft and shipping, both of which may not be available during extraordinary times. Aircraft may not be able to access a given area due to weather conditions or because the weather may have deteriorated runways. Operators and pilots may also refuse to enter crisis-stricken areas, such as those experiencing armed conflict, thereby creating a lack of transportation assets in a given area. Obviously, if an area experiences a lack of transportation assets, then it is likely that the area will not receive needed supplies. This reduces food supplies, medical supplies, and equipment, thereby creating a commodity shortage. It is important for private and public entities to plan ahead by delivering needed commodities ahead of time. Many communities and organizations periodically order important commodities in order to prevent shortages due to transportation concerns. Moreover, these organizations may order extra supplies so that they can use them should a commodity shortage occur due to transportation concerns.

Organizations often experience a commodity shortage simply because they do not have adequate storage facilities. If commodities are not properly stored, they may be lost due to a variety of reasons, including theft, damage, pestilence, or other infestations. Many communities lack adequate storage facilities for both perishable and nonperishable commodities for a variety of reasons. These reasons may include lack of funding to purchase proper storage facilities, lack of security forces, and lack of experience with commodity storage, especially for foodstuffs and medical supplies. It is not uncommon for organizations in crisis-stricken areas to lose the majority of their commodities due to theft. These organizations are often prohibited from employing armed security forces, so they understand that theft by armed groups is to be expected with commodities.

In war-torn areas of the world, it is quite common for the general population to experience a commodity shortage. As many of these areas are ruled by dictatorships, the government simply ensures that its own forces are supplied with the majority of goods while the population receives very little. Unfortunately, during a commodity shortage the available supply often goes to the highest bidder instead of to the people who need the commodities most. Because the poor do not have the resources to purchase these high-priced commodities, they face injury and death. Governments and NGOs often deploy troops or large groups of volunteers to counter these efforts by rough leaders. The United Nations may intercede by providing transportation assets and manpower to deliver and protect key commodities such as food, water, and medical supplies.

Organizations such as the World Health Organization (WHO), Doctors Without Borders, and Feed the Children are often called upon to supply key commodities such as food, medical supplies, and water to areas of the world experiencing a shortage. These organizations often work in conjunction with or under the direction of the United Nations (UN). The United States government is the largest supplier of emergency commodity supplies of any nation in the world. Food supplies, clothing, and other items are often sent to areas facing crisis through the United States Agency for International Development (USAID), an agency of the U.S. Department of State.

Prevention Efforts

Commodity shortages may be reduced by effectively planning for crisis in advance. These efforts include stockpiling food supplies and protecting food supplies from viruses, bacteria, and pestilence. Medical supplies and equipment can also be stockpiled in strategic locations to prevent shortages. Stockpiling these supplies and equipment in secure locations to protect them from the weather, theft, or pestilence is the key to reducing future shortages. Nongovernmental organizations and government agencies alike often pre-stage commodities should they be needed during a crisis. These commodities include medical supplies, foodstuffs, parts, shoes, bedding, clothing, and related equipment and supplies. Governments can also prevent commodity shortages by working with the private sector to ensure that commodities remain available as needed. Developed countries can also work together to prevent armed conflicts or provide specialized military teams whenever armed conflict is all but unavoidable.

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See Also: Crisis Communications; Documentation; Doctors Without Borders; Emergency, Definition of; Emergency Medical Care; Emergency Responders; Evacuation; Food Security; Health and Medical Response Scenarios; Mutual Aid and Assistance; Nongovernmental Organizations; Preparedness; Response; Training; Transportation Security; Uncertainty.

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Contingency Planning

Contingency planning in emergency management takes place within many different contexts and management settings. This has led to variety in management approaches and the terms used to describe contingency planning. To provide a broadly applicable definition of contingency planning in emergency management and draw attention to some examples of approaches and terms applied in different settings, seven areas of contingency planning will be reviewed: the definition of contingency planning, the importance of contingency planning, the governance context of contingency planning, contingency planning and international assistance, contingency planning in national settings (the United Kingdom and the United States), multilevel coordination, and contingency planning and complex systems.

Defining Contingency Planning

The *Oxford* dictionary defines the word *contingency* as "a future event or circumstance which is possible but cannot be predicted with certainty." Contingencies (such as a tsunami, earthquake, drought, or epidemic) that produce emergencies are the focus of contingency planning. The Inter-Agency Standing Committee (IASC; a forum involving United Nations and non-UN partners for humanitarian assistance) defines contingency planning relating to humanitarian crises, but the definition is applicable more generally and is a recognized standard within the United Nations system. The IASC defines contingency planning as "a management tool used to analyze the impact of potential crises and ensure that adequate and appropriate arrangements are made in advance to respond in a timely, effective, and appropriate way to the needs of the affected population(s). Contingency planning is a tool to anticipate and solve problems that typically arise during humanitarian response."

In research on drought contingency planning for the United Nations International Strategy for Disaster Reduction (UNISDR), Lesukat Marko points out that emergency managers sometimes use the terms *contingency planning* and *contingency plan* interchangeably. He draws attention to the important conceptual distinction between these terms, showing that while contingency planning is a systematic management process, a contingency plan is a product of that process.

Importance of Contingency Planning

When carried out well as part of an integrated approach to emergency planning, contingency planning enables planners to anticipate problems and identify appropriate responses to deal with emergencies. Contingency planning ensures that public agencies, nongovernmental organizations (NGOs), and communities are better prepared for situations that require emergency response. Contingency plans detail specific risks that require attention beyond the provisions of general plans. Contingency plans contribute to an integrated approach to emergency response and highlight specific training and exercise requirements to deal with particular kinds of emergency. Good contingency planning thereby enhances organizational and community resilience.

Governance Context

Different management regimes provide different national and agency contexts. United Nations agencies and national governments that commit to democratic, effective, and efficient emergency management recognize the need for a governance framework that provides the conditions for effective leadership to guide the planning process; accountability and transparency in management; the participation of stakeholders in the planning process; good coordination and communications; and the enhancement of sustainability, robustness, and resilience.

International Assistance

The UNISDR promotes common understanding and usage of disaster reduction concepts, and the Hyogo Framework for Action (HFA) 2005–2015 underlines the need for more consistent terminology related to disaster risk reduction. The IASC regards contingency planning as part of preparedness in accordance with Priority 5 of the HFA that refers to "strengthening disaster preparedness for effective response at all levels." Preparedness under the HFA involves "increasing the capacity to predict, monitor and be prepared to reduce damage or address potential threats" and "strengthening preparedness to respond in an emergency and to assist those who have been adversely affected."

This requires that stakeholders work together effectively. According to UNISDR, contingency planning "results in organized and coordinated courses of action with clearly-identified institutional roles and resources, information processes, and operational arrangements for specific actors at times of need." Contingency planning, for UNISDR, allows "key actors to envision, anticipate and solve problems that can arise during crises." Contingency planning is an important aspect of overall preparedness, and it is a process involving the regular updating and exercising of contingency plans. The UNISDR regards the strengthening of national integrated mechanisms conducive to effective preparedness planning.

Jim Good, writing for the United Nations High Commissioner for Refugees (UNHCR), describes this as a "dynamic process" where it is important to move beyond the limitations of formalistic contingency plans that may not properly fit into a wider strategic framework of emergency planning. As Lesukat Marko shows, contingency plans on their own are insufficient to achieve effective preparedness and response. Contingency planning should be part of a wider integrated strategy where the linkages between preparedness, response, and recovery are explicit, with a commitment to community resilience and sustainability. The International Risk Governance Council (IRGC) points out that contingency planning should nest within a broad risk governance framework where stakeholders should be alert to complex and emerging risks as well as to the specific risks alluded to in contingency plans. Risk and emergency management will significantly contribute to resilience if stakeholders appreciate the complexity and interdependencies of systems that can produce unexpected types of emergency and multi-hazard disasters.

In its report titled "Inter-Agency Contingency Planning Guidelines for Humanitarian Assistance," the IASC refers to international assistance efforts involving UN agencies, NGOs, and others such as the International Red Cross. The IASC advocates general preparedness planning that establishes a standing capacity to respond to emergencies together with contingency planning that is preparedness and response planning for a specific emerging or anticipated crisis. General preparedness planning and contingency planning share many of the same planning activities, the main difference being the concentration in contingency planning on a specific risk or risks.

Contingency planners therefore need expertise in response preparedness, needs assessment, and coordination while they assume responsibility for addressing a specific risk or risks. Contingency planners must understand the nature of coordination between agencies and other stakeholders and should address coordination gaps. Contingency planners must be aware of the capacities, including training and skills, of potential responders, and contingency planning generally involves putting in place a trigger or link to an early warning system that puts the contingency plan into operation.

According to the IASC guidelines, there are four elements demanding strong coordination and process management in their conception of the contingency planning process. These elements are the following:

- *Preparation:* Preparing for and organizing the contingency planning process.
- *Analysis:* The assessment of hazards and risks, building scenarios, and developing planning assumptions.
- *Response planning:* Defining response objectives, defining coordination and management arrangements, and developing and embedding response plans.
- *Implementing preparedness:* Regarding the planning process as iterative, leading to continual improvement.

For the IASC, the contingency planning process generates outputs reflecting the different phases of planning, and these outputs, according to the IASC guidelines, should be included in a contingency plan typically constructed as follows:

- *Executive summary:* An overview of the plan and its elements.
- *Hazard and risk analysis:* A brief summary of the hazards and risks analyzed as part of the contingency planning process.
- *Scenarios and planning assumptions*: Brief summaries of agreed scenarios and planning assumptions underlying the contingency plan.
- *Objectives and summaries:* Concise statements of objectives, strategies, and guiding principles.
- *Overall management and coordination arrangements:* Identifying clusters and designated lead agencies/organizations (with a diagram showing coordination mechanisms), and covering arrangements for appeals and funding, information management, and cross-cutting issues.

- *Summary of sector/cluster response plans:* (a cluster is "essentially a sectoral group," such as education or health): Outlining sectoral participation, objectives, and response actions along with a gap analysis and indication of the standards guiding response.
- *Preparedness actions:* Agreed priority preparedness actions, and preparedness actions by sector.
- *Annexes:* Summaries of sector plans, a schedule for the implementation of preparedness actions, and terms of reference for sector/cluster groups.

The IASC emphasizes that contingency plans are not instruction manuals for responders. Instead, they establish working relationships, standards, and coordination between stakeholders. Contingency plans thus concern "solving potential problems ahead of time."

Contingency Planning in National Settings

In the United Kingdom (UK), duties under the UK 2004 Civil Contingencies Act oblige stakeholders variously to engage in emergency planning, risk assessment, business continuity planning, warning and informing, and promoting business continuity management. The act mainly concerns preparedness through assessment and preparation. It does not cover response and recovery directly but does deal with "preparedness for response." Contingency planning, as a pre-emergency process, is an aspect of preparedness for response.

The Cabinet Office guidance on emergency preparedness provides an overview of the emergency planning process that addresses emergencies with domestic and international implications. The guidance establishes principles that apply across a range of emergency planning situations. The guidance commits to Integrated Emergency Management (IEM) that includes six related activities as follows:

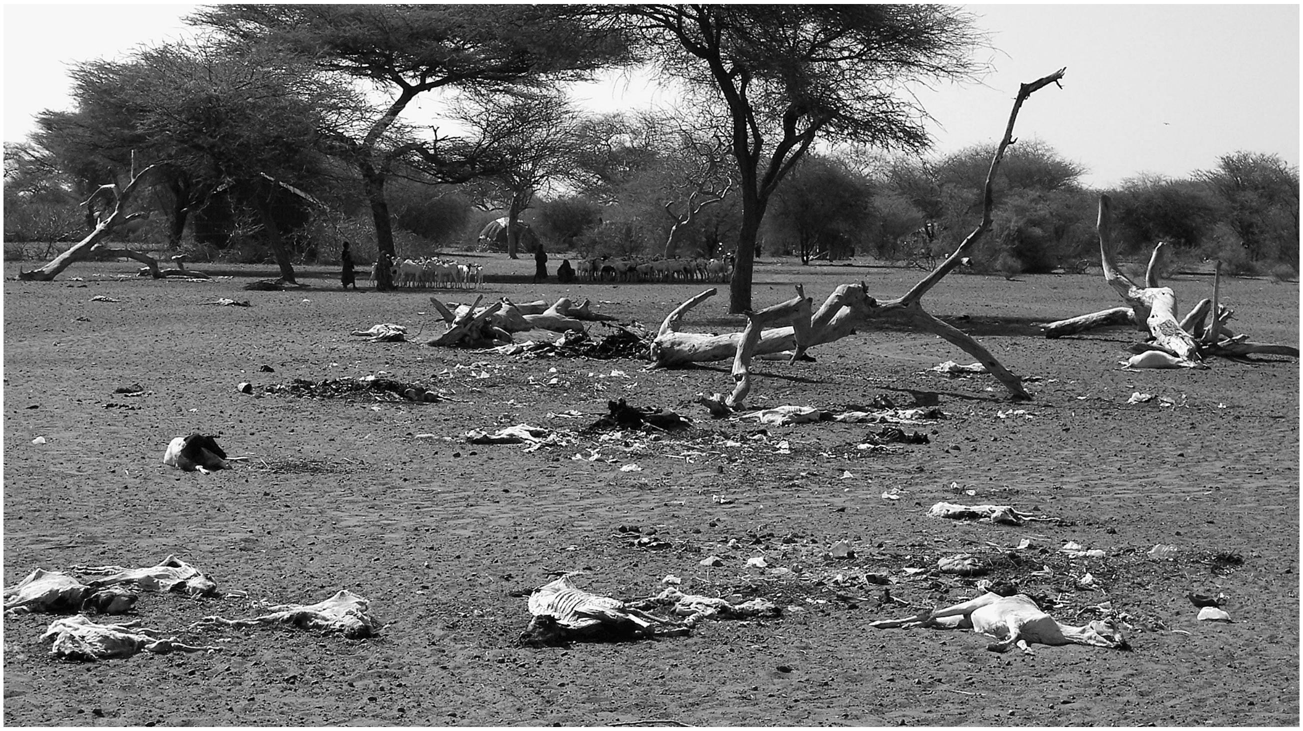
- Four preparedness activities:
    - » Anticipation, or horizon scanning, where responders become aware of risks
    - » Assessment includes risk assessment, capability analysis, readiness assessment, and establishing planning parameters
    - » Prevention deals with fire safety, building regulations, and actions that help prevent an emergency
    - » Preparation includes the production of plans and exercising. It concerns emergency "preparedness for response" set within IEM
- Two post-emergency activities:
    - » Response concerns the detailed decisions and actions to deal with the immediate after-effects of an emergency, such as command and control, coordination, and communications
    - » Recovery concerns the restoration of communities following an emergency

While contingency planning involves "preparation," it is an important element in overall preparedness and IEM. Contingency planning thus involves activities used in other types of emergency planning. For example, it involves anticipating risk and taking account of safety assessments and regulations. Contingency plans refer to these as well as defining response and recovery roles. Because contingency planning concerns specified risks, it involves the development of scenarios for those risks and making agencies and the public more aware of them.

The UK guidance indicates the following plans used in emergency preparedness:

Generic plans relate to any emergency. A generic plan can act as a "core plan" for emergency staff and resource mobilization. Such plans build awareness and complement multiagency integrated major incident response systems such as command and control.

Specific hazard or contingency plans deal with a specific risk or risks, or particular kind of emergency. Contingency plans move from the general to the particular, addressing such events as oil pollution, chemical spill, or flu pandemic. Specific plans generally are multiagency, covering different agency roles. Such plans commonly involve different levels of government, as in the British National Contingency Plan for Maritime Pollution. Specific



The 2005–06 drought in Somalia had a severe impact on livestock. Despite the cyclical pattern of droughts in the Horn of Africa, there are no national preparedness plans in Somalia or Ethiopia. According to a report by the Humanitarian Policy Group, there is an absence of national and sufficient local contingency funds to rapidly implement large-scale plans. The lack of effective coordination between district and national levels prevented existing contingency plans from forming wider national and international responses.

plans are appropriate when generic arrangements are insufficient for dealing with the peculiarities of a particular case. There are specific site or location plans as well as wide-area plans for such events as floods, storms, and chemical contaminations. "Slow-building wide area emergencies," such as severe weather conditions or drought, also have plans. Most responders employ specific plans within the context of a generic plan.

Staffordshire Emergency Flood Plan (SEFP) outlines the contingency planning process with reference to a local flood plan in the English county of Staffordshire, according to Andrew Marshall, director of civil contingencies in Staffordshire. Flooding is one of the greatest risks in Staffordshire, potentially affecting communities, local governments, health sector organizations, the emergency services (fire, police, and ambulance services), and other organizations. SEFP involved more than 40 organizations, over two years, contributing to production of the original 2009 plan. This involved a structured project management approach, including consultation with partners working within the IEM framework.

The Staffordshire Resilience Forum (SRF) is the multiagency partnership responsible for flood contingency planning in the county. The SRF worked with the supporting Staffordshire Civil Contingencies Unit (SCCU) that populated a regularly reviewed Community Risk Register (published on the Staffordshire Prepared Web site). Partners highlighted various risks, thereby helping the SRF to prioritize resources for concerns of greatest need. Flooding ranked as one of those priority needs.

The Community Risk Register led to a formal request for the development of a multiagency contingency/response plan to address flooding through two key meetings. One involved tactical leaders, and the other strategic SRF leaders. Following acceptance of the flooding risk, planners produced a business case behind the requirement for a specific contingency/response plan for flooding. The strategic leaders then agreed on a project to see the planning through, and a local government authority in London peer-reviewed the plan, followed by a three-day multiagency validation exercise.

The United States provides another example involving complex multiagency contingency planning. In the wake of the 2001 9/11 attacks, the United States, Federal Emergency Management Agency (FEMA), along with other federal agencies, programs, and offices, in 2003 became the U.S. Department of Homeland Security (DHS). In 2005, Hurricane Katrina underlined the need for stakeholders to collaborate effectively and rationalize emergency planning. Before Katrina, the DHS produced the 2004 National Response Plan, superseded by the 2008 National Response Framework (NRF), which underscored the need for multilevel coordination.

The DHS Contingency Planning and Incident Management Division (CPIMD) coordinates and implements the "incident management" functions for its Office of Infrastructure Protection (IP) covering contingency planning, preparedness, continuity, and incident planning. Contingency planners within IP work with FEMA officials and others in supporting actions in line with national NRF policy. The DHS supports the development of plans and procedures for preparedness and incident management, and CPIMD has a Business Continuity and Emergency Preparedness Team that ensures that IP operations are effective. National Planning Scenarios depict various "high-consequence" threat scenarios, including terrorist attacks and natural disasters, intended to provide a focus for contingency planning and preparedness work.

The DHS National Preparedness System (NPS) covers preparedness, protection, response, and recovery. A National Incident Management System (NIMS) involves all levels of government, NGOs, and the private sector, providing a standardized framework compliant with the NRF. The NIMS has a clear management process focus, under NIMS strategic, operational, and tactical plans, each incorporating a clearly defined process for joint action and multilevel cooperation through integrated planning. General plans might relate to "scenario-specific" plans or include annexes based on risk assessments, while contingency plans focus on specific risks.

An Integrated Planning System (IPS) (complementing NIMS) applies to federal agencies relying on or helping other agencies, and its plans are in relation to the National Planning Scenarios. The IPS refers to contingency (pre-incident) planning supporting post-incident crisis action planning. As in other nations, the DHS regards contingency plans as concentrating on specific threats or scenarios, and according to the guidance on the Integrated Planning System, contingency planning facilitates a transition to crisis action planning.

Multilevel Coordination

It is thus vital to process-manage contingency planning and coordinate stakeholders, whatever the context. The Staffordshire Emergency Flood Plan depends upon interagency collaboration and coordination in national/local settings. The DHS in the United States refers to coordinating homeland security at strategic, operational, and tactical planning levels, while the IASC refers to three levels of contingency planning in international assistance initiatives involving UN agencies and other stakeholders. The first IASC level involves providing a common framework within which a contingency plan will fit. The second level is sector/cluster level planning, which defines how agencies will work together to achieve sector-specific objectives. At the third level, organization-specific planning defines organizational arrangements. Effective contingency planning involves the interaction of all these levels.

Illustrating this, the International Federation of Red Cross and Red Crescent Societies (IFRC) employs contingency planning as part of a disaster response planning process, with "integrated programming" coordinating stakeholders from different sectors. The IFRC emphasizes risk reduction and mitigation through a form of preparedness planning directly engaging local people in devising and implementing measures to enhance community resilience. However, different stakeholders have different needs, and this makes coordination difficult. Planners need to be sensitive to expectations at each level of planning. At the highest level, "institutional disaster planning" defines the scope of humanitarian action, providing a strategic policy commitment; at the second level, "disaster response planning" involves collaboration to reach a "level of preparedness for timely and effective response." For the IFRC, this involves developing a disaster response plan that is "preliminary in nature" based on "educated assumptions of risks and hazards." At the third level, contingency planning establishes operational procedures for direct humanitarian action. Contingency planning involves "scaling up" to address specific risks likely to have been identified during general response planning. The contingency plan can address local, national, regional, and international risks, as with earthquakes, terrorist attacks, and epidemics. The contingency plan defines operational procedures for responding to a disaster based on anticipated levels of resources and takes account of the available resources and capacities of organizations and communities.

Contingency Planning and Complex Systems

Much thinking underlying contingency planning reflects rational management attempts to identify and concentrate upon specific risks. In the past, emergency planners have often tended to be "plan focused" and less concerned with processes and complex interrelationships between different kinds of risk. According to the IRGC, such "reductionism" tended to focus down on particular problems and modes of preparation at the expense of holistic thinking about the complexity of crises. The IRGC regards contingency planning as a valuable management tool, but for the IRGC it is important continually to learn lessons from emergencies by holistically viewing systems complexity and appreciating "emerging risks" that are familiar or new risks, which become apparent in unfamiliar conditions.

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See Also: Disaster Recovery; Fusion Center; Incident Action Plans; Operational Plans; Operational Readiness; Pre-Crisis Training and Planning; Pre-Impact Planning Process; Preparedness; Recovery; Resiliency; Response; Risk Analysis; Risk Assessment; Scenario Planning; Strategic Plans.

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Contingent Coordination

Coordination within an organization is often viewed as a critical factor in success. Effective coordination ensures that all organizational activities are working in an aligned manner, recognizing that the functional areas within any organization are often interdependent. The concept is relatively clear for existing organizations, but is less so for the ad hoc organizational structures normally found in crisis management, where multiple agencies may be called upon to work together to address a complex problem.

Traditional Coordination

Traditionally, coordination has been viewed as a managerial role within an organization. Formal leaders are tasked with setting goals for the organization, then ensuring all internal activities are aligned to maximize the potential for efficacy and efficiency. In such instances, coordination is necessary to ensure that all interdependent functions within the organization work in harmony, supportive of the efforts of the collective, with no function being left unaddressed. Within this traditional context, coordination is associated with a number of leadership and management concepts such as the setting of goals, the development of objectives, the allocation of resources, and the establishment of acceptable outcomes.

In a traditional organizational setting, coordination is normally associated with management of that organization. Although some aspects of the organization may be influenced by external factors, including the guidelines of regulatory agencies and market pressures, final decisions related to operational functions are normally developed internally. Although these efforts may be made using a fully authoritarian model, a model that maximizes employee participation, or any permutation in between, there is typically little concern, if any, for aligning operations with the efforts of other organizations, let alone yielding control of operations over to others.

Contingent Coordination

The term *contingent coordination* may be defined as the ability and willingness of organizations to work outside their normal operational and administrative parameters by partnering with other organizations. This partnership is not necessarily reflected in a full integration of multiple agencies into a virtual organization where decisions are made collectively, but instead is reflected by a number of agencies working together by temporarily yielding their authority to another. In doing so, the agencies essentially subsume their organizational goals to the goals of other organizations, with an understanding that, at some later point, they will become the lead agency, with others supporting them in the attainment of their own organizational goals.

There are a number of challenges to contingent coordination. Appointed officials in public organizations often are constrained by the documents that frame their power and discretion. In some instances, while contingent coordination is not prohibited, it is not recognized as an option within the formal organizational framework, which means utilizing such an approach may differ vastly from the past practices of the organization. In effect, it requires appointed officials to exceed their authority, or at least to temporarily yield it, recognizing that in doing so the organization is deferring achievement of its own mission, which could be construed as negligence. This concern may lead to some hesitancy to engage in such practices, especially if the elected leadership of the locality does not encourage or support innovative and flexible approaches. Therefore, while contingent coordination does provide a potentially valuable means for organizations to work together to solve complex problems, to be effective, the approach must be supported by the elected leadership of the jurisdiction.

Coordination and Crisis Management

Disasters rarely pose a single threat to a community. A natural disaster such as an earthquake requires a number of professional disciplines to work together. The same is true in a human-action event. Additionally, disasters rarely remain contained within the limits of a single jurisdiction. Therefore, it is unlikely that any single organization will have sole responsibility for an incident. In practice, the circumstances are more likely to be that multiple disciplines will have concurrent jurisdiction. Illustrative of this, after a tornado strikes, law enforcement seeks to secure the area and search for victims; the fire service concerns itself with damaged structures, chemical leaks, and fires; emergency medical services treats and transports the injured; public works clears the debris; and private utility companies seek to restore services to the affected areas. Coordination of these activities by a single entity is problematic, given that no single agency has sufficient authority or technical expertise for all necessary functions. One means of addressing this in crisis management is to use contingent coordination.

During the response to Hurricane Katrina, this became a significant issue for federal agencies. Formal role delineation was clear but fragmented. Exacerbating the problem was the lack of resources to conduct operations simultaneously. Based strictly on the National Response Plan and normal practices, federal agencies may very well have elected to work on their own areas of primary responsibilities, creating a fragmented response. Instead, representatives from a number of federal agencies discussed the collective issues faced, identified a list of priorities, then yielded their own authority to other agencies temporarily, carrying out operations in a systematic manner, sharing resources throughout. Although this was by no means a universal or perfect approach, in many instances it facilitated a coordinated response that supported efficient and effective delivery of services. This has not always been the case in times of crisis.

Beginning in late 2001, a series of anthrax attacks occurred in the United States. During one such event, the Federal Bureau of Investigation (FBI) and various public health agencies experienced problems. The FBI, noting that terrorism fell within its purview, insisted it was in charge of all operations, stating that no information about the events should be released because it might negatively impact the criminal investigation. Public health agencies at the state and local levels argued that anthrax posed a significant public health risk, making it their responsibility. According to their operational model, an effective response included an active public education campaign of the potential risks, the signs and symptoms of exposure, and the most appropriate means of treatment. This placed the two disciplines at loggerheads for some time. Although they eventually came to terms, an approach based on contingent coordination may have greatly limited conflict.

In 1992, during the Los Angeles, California, riots, a number of local, state, and federal agencies responded to incidents of rioting, criminal activities such as assault and robbery, and numerous fires. Though this was over a decade before the implementation of the National Incident Management System (NIMS), agencies in Southern California were well versed in the Incident Command System (ICS) used in California since the early 1970s. Because of the extensive geographic area involved, as well as the number of differing agencies that were engaged, coordination using an ICS became problematic. Many agencies set up their own ICSs, focusing narrowly on their own jurisdictions or the issues of primary concern to only their agency. Some state and federal agencies continued to use their normal operational approaches, which involved decision making at the state or federal level, with little interorganizational communication evident. Taken together, these actions contributed to role ambiguity, overlapping responses, service gaps, and

Case Study: Motor Vehicle Collision

Contingent coordination occurs every day, often outside the view of the public. It becomes a useful tool whenever multiple agencies with concurrent jurisdiction must work together to achieve success. Though the specifics of this framework may change due to state law, the conceptual model will be consistent.

In many states, by law, law enforcement has full authority over motor vehicle collisions. In many states, by law, fire departments have full authority over hazardous materials spills, including gasoline and oil spilled during motor vehicle collisions. In many states, by law, emergency medical services (EMS) have full authority over any injuries. A potential conflict occurs when these laws look at such issues in isolation, with no appreciation that they may frequently be combined in a single emergency incident. There is usually nothing in the legal structure of public safety that provides for the primacy of a single agency, and also nothing that gives any single discipline authority over the other disciplines.

To address this potential conflict, on-scene emergency responders engage in contingent coordination. Recognizing they all have independent missions, they agree to work for one another. Typically, patient care will take priority, which will result in EMS providers taking the primary role, with the others assisting as needed. Once the patient care issues are addressed, the chemical and environmental hazards are addressed by the fire department taking the lead, with others assisting it. Finally, law enforcement takes the lead in both the investigation of the incident and the removal of debris from the scene, with other agencies assisting it. Instead of using a unified command system, the agencies rotate command authorities based on an agreed upon set of priorities being matched to the technical proficiencies and authorities of each agency.

the appearance that governmental systems had collapsed. To some extent, these issues could have been addressed through contingent coordination, with agencies temporarily yielding their authority to others, but that is not always possible.

During the 1992 Los Angeles riots, a confounding issue for the application of contingent coordination was the presence of the active-duty military. Although National Guard units operating as state units under Title 32 of the U.S. Code can be assigned to work for local and state agencies, under Title 10, neither they nor the active-duty military can be placed under the operational authority of local or state agencies. By law, they are under the direction of the Department of Defense, which permits them to coordinate their activities with others but does not sanction their ability to yield authority. If the Insurrection Act of 1807 is implemented, an area is effectively under martial law, with local and state agencies working for the military. Although this permits direct coordination by the military, it does not permit contingent coordination, as the Insurrection Act does not provide for local or state agencies to exchange command authority with active-duty military forces. Consequently, in some limited instances, contingent coordination may not be possible, though a Unified Command System may still be possible.

A common thread in disaster research involves problems with coordination. In some instances, coordination was ineffective due to a lack of training. In other instances, coordination was limited by interorganizational conflicts. In other instances, coordination was problematic because with all agencies trying to address their own primary concerns first, resources were lacking to provide services at the desired levels of quality and quantity. During crisis management, contingent coordination offers agency leaders a framework for working together to achieve the individual needs of all organizations in an effective and efficient manner, thereby providing higher levels of customer service to their communities.

Comparisons to Unified Command

One of the components of the National Incident Management System relates to command and control, which includes the Incident Command System (ICS). The ICS is a flexible, scalable framework for coordinating a multi-organizational response. When used as an ICS, there is a single incident commander coordinating activities. This is often found when the scale or severity of the incident is small, with a single hazard that clearly fits within the parameters of a single organization, such as a house fire. When multiple organizations have concurrent jurisdiction, the ICS may become a Unified Command System (UCS). In a UCS, representatives from agencies with statutory authority work in unison to make decisions related to the incident. Although this is similar to contingent coordination, there is a subtle difference. In a UCS, multiple organizations make decisions in a collective manner. Using contingent coordination, an ICS will be used, with the person filling the position of incident commander changing based on the agency having the lead role at any given time.

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See Also: Command and Control; Emergency Management, Principles of; Emergency Manager; Federal Emergency Management Agency (FEMA); Incident Management; Mutual Aid and Assistance; National Incident Management System (NIMS); National Response Framework; Preparedness; Response Team; Training.

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Continual Improvement

Continual improvement in crisis management is the process by which an organization deals with the need for change. Implementing change is essential for organizations to effectively respond to increasingly diverse types of crises. The means by which continual improvement is implemented vary depending on the organization's purpose, function, and structure. However, there are some commonly accepted methods and approaches to continual improvement in crisis management for most organizations, including but not limited to lessons learned from the experience of an actual crisis, contingency and continuity planning, improving coordination and communication, total crisis management (TCM), and implementing best practices.

Learning From a Crisis to Effect Change

In the wake of a crisis, enlightened organizational decision makers adopt a learning orientation and draw upon prior experience to develop new and more effective routines and behaviors that ultimately change the way the organization operates. The best leaders are purposeful and skillful in finding the learning opportunities inherent in every crisis situation. In times of crisis, communities and constituencies expect their public leaders to minimize the impact of the crisis at hand. Public leaders have a special responsibility to help safeguard society from the adverse consequences of crisis. Experts in crisis management note that leaders who take this responsibility seriously are attentive to all crisis phases: the incubation stage, the onset, and the aftermath. Crisis leadership then involves five critical tasks: sense making, decision making, meaning making, terminating, and learning. Lessons learned from surviving a crisis often open a window of opportunity for reform in the future.

Contingency and Continuity Planning

Contingency and continuity plans are essential components of a sound and comprehensive crisis management plan. Contingency plans should contain information and guidance that will help decision makers to consider not only the short-term consequences but also the long-term effects of every decision. Each critical function and process that is necessary to keep an organization running must have its own contingency plan in the event of failure or cessation. Business continuity plans can help minimize the disruption to an organization that undoubtedly occurs in a crisis.

Advance planning and practice help ensure that an organization is appropriately and adequately prepared for a crisis. Crisis management teams can rehearse a crisis plan by developing scenarios simulating collapse or interruption of operations and by responding as planned. Testing and rehearsing contingency plans heightens awareness of the possibility of an actual crisis and prepares crisis team members to act quickly and effectively. Fine-tuning the crisis plan can be undertaken to increase clarity, speed, efficiency, accuracy, and effectiveness of response from the onset of a crisis to its aftermath and resolution.

Improving Government Efforts

Local, state, and federal governments play a vital part in crisis management, which is considered one of the primary roles of government. Emergency services, such as fire and police departments at the local level and the U.S. National Guard at the federal level, often play integral roles in crisis situations. To help coordinate communication during the response phase of a crisis, the U.S. Federal Emergency Management Agency (FEMA) within the Department of Homeland Security administers the National Response Plan (NRP). This plan is intended to integrate public and private response by providing a common language and outlining a chain of command when multiple parties are mobilized. It is based on the premise that incidents should be handled at the lowest organizational level possible. The NRP recognizes the private sector as a key partner in domestic incident management, particularly in the area of critical infrastructure protection and restoration. The NRP is a companion to the National Incident Management System, which acts as a more general template for incident management regardless of cause, size, or complexity. FEMA offers free Web-based training on the NRP through the Emergency Management Institute. Common alerting protocol (CAP) is a relatively recent mechanism that facilitates crisis communication across different media and systems. The CAP helps create a consistent emergency alert format to reach geographically and linguistically diverse audiences through both audio and visual media.

Total Crisis Management

A comprehensive approach to implementing continual improvement in crisis management is adopting principles and practices similar to that of total security management (TSM). TSM is the business practice of developing and implementing comprehensive risk management and security practices for a firm's entire value chain. This business strategy seeks to create added value for companies by managing security and resilience requirements as core business functions as well as to enhance asset management, increase brand

U.S. Air Force members of Operation Tomodachi coordinate gear at Sendai Airport, Japan, on March 16, 2011. The 353rd Special Operations Group, the U.S. military's humanitarian and relief effort in response to the 9.0-magnitude earthquake and tsunami that struck Japan on March 11, 2011, established a usable runway at the airport. For many relief organizations, the tsunami was an event that became a source of lessons learned in order to determine best practices for future events.

equity and goodwill, and improve preparedness and resiliency. The TSM name borrows from the management concept Total Quality Management (TQM), an approach made famous by the work of W. Edwards Deming. The TQM concept revolutionized the manner in which quality was perceived in industry, encouraging it to be integrated into the core business processes of a firm. A company or agency using the TSM methodology utilizes a framework of focus points, metrics, and feedback loops in order to elevate risk management from a noncore objective to an essential business function. This process includes establishing and creating a compliance management plan, implementing operational processes, evaluating the effectiveness of operational plans, making appropriate changes as necessary, sharing successful lessons learned with internal and external stakeholders, and pursuing continual incremental improvement.

On December 16, 2009, the U.S. Securities and Exchange Commission (SEC) approved Rule No. 33-9089, which went into effect on February 28, 2010. This rule requires companies to increase their reporting of risk management practices, including details about the manner in which risk oversight is administered. The ruling has generated increased interest in implementing the TSM approach to ensure compliance with the updated SEC guidelines. In January 2010, the International Organization for Standardization (ISO) 28000 was updated to include an explicit reference to the Plan-Do-Check-Act model of quality management popularized by Deming.

Applying Best Practices

The term *best practices* refers to a set of principles and guidelines about the process and content of crisis management, including methods, skills, new technologies, training, drills, exercises, and other relevant information resulting from advances from scientific discovery, findings from case studies and field research, and lessons learned from actual crises and disasters. There is a high degree of consensus among practitioners and scholars, as well as supporting scientific evidence, that these methods and techniques are highly effective in responding to crisis. For example, a case study that reveals advances in warning systems, training, drills, and improvements in preparation for and response during and after a crisis often can set a standard for a best practice for crisis management. Recent developments that have provided guidance on best practices for crisis management are rapidly growing scientific literature, analysis and consolidation of practitioners' cumulative experiences, and the allocation of significant resources by government agencies and the private sector to improve crisis management. Recent sources for best practices incorporate lessons learned from events such as the tsunami in Japan in 2011, Hurricane Katrina in 2005, the transportation system bombings in London in 2005, the tsunami in the Asia Pacific region in 2004, the SARS outbreaks of 2003, and the terrorist acts of September 11, 2001.

The best practices framework is practice driven and seeks to blend the experiences of those who implement or engage in risk and crisis communication across a variety of circumstances and populations. However, scientific theories and strong evidence derived from systematic inquiry also inform best practices. Moreover, best practices should be considered works in progress because new evidence is forthcoming and lessons learned from real-world events are ongoing. The most useful sources for best practices acknowledge their tentative nature. They caution that many of the principles will be refined as events and evidence dictate and as new or emerging risks present opportunities for learning.

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See Also: Business Continuity Planning; Business Continuity Planning Life Cycle; Contingency Planning; Federal Emergency Management Agency (FEMA); National Incident Management System (NIMS); Risk Analysis.

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Continuity of Government

Continuity of government (COG) is the principle of establishing defined procedures that allow government, at all levels, to continue its essential executive, legislative, and judicial operations and functionality in the event of a catastrophic event or conflict. Modern COG planning can be traced back to World War II–era Great Britain. COG planning grew and evolved throughout the Cold War and is still a relevant and essential function in the era of weapons of mass destruction proliferation and global terrorism.

COG planning is a common practice internationally. Canada, Sweden, France, Norway, the United Kingdom, and numerous other countries across central and Western Europe are known to have active COG planning initiatives. Because of the sensitive nature of these plans, very little information is readily available to the general public regarding plan specifics, especially among former or current adversaries.

In the United States, COG planning dates back to at least the Cold War and has its roots in the National Security Act of 1947; it remains a top priority in the post-9/11 era. Throughout their history, continuity of government plans have been completely or partially classified to prevent an adversary from using the information contained in the plans as a blueprint for attack, sabotage, or propaganda. Early continuity of government planning was designed to ensure that the government of the United States would be able to continue operating after a catastrophic national emergency, including nuclear conflict. Modern planning initiatives have seen the addition of micro or targeted threats to the macro threat of global nuclear conflict. To date, the United States COG plan, or Continuity of Operations Plan (COOP), has been activated only once. Regardless of era, a common theme of all COG planning is the need to provide an organized and legal model for the transition of power and responsibilities during times of crisis, while keeping the society as close to normal as possible.

Leadership and Authority Delegation

Order of leadership succession must be strictly defined at all levels of government to avoid unlawful transitions or consolidations of power and facilitate a smooth transition of power. Although succession orders at the local or municipal levels can often be accomplished with a simple organizational chart, state and federal governments require codified legislation due to the complexity and scope of government at these respective levels. There are often similarities between state and federal orders of succession, as illustrated in the order of succession for the office of president of the United States of America:

1. Vice president
2. Speaker of the House of Representatives
3. President pro tempore of the Senate
4. Secretary of State
5. Secretary of the Treasury
6. Secretary of Defense
7. Attorney general
8. Secretary of the Interior
9. Secretary of Agriculture
10. Secretary of Commerce
11. Secretary of Labor
12. Secretary of Health and Human Services
13. Secretary of Housing and Urban Development
14. Secretary of Transportation
15. Secretary of Energy
16. Secretary of Education
17. Secretary of Veterans Affairs
18. Secretary of Homeland Security

A sample order of succession for the office of governor is as follows:

1. Liutenant governor
2. President of the Senate

3. Speaker of the House
4. Whoever is highest ranking among the following offices and is eligible to serve as governor:
    a. Secretary of State
    b. Auditor
    c. Treasurer
    d. Superintendent of Public Instruction
    e. Attorney general
    f. Commissioner of Agriculture
    g. Commissioner of Labor
    h. Commissioner of Insurance
    i. Commissioner of Public Safety

A sample order of succession for the office of town or city mayor is as follows:

1. Vice mayor
2. Town or municipal council designee

A sample order of succession for the office of town or city manager is as follows:

1. Assistant town or city manager
2. Public works director
3. Police chief
4. City attorney

Specific statutes and laws differ from state to state regarding legal requirements for the office of governor, so individual state succession plans will vary as well, especially in states where individuals are permitted to serve in cabinet-level secretary or commissioner offices while not meeting the requirements or eligibility for the office of governor.

Delegation of essential functions and authorities should be clearly identified at all levels of government, cabinets, and departments as a contingency for the loss of leadership or the reassignment of leadership. All eligible leaders or personnel in a line of succession must have a baseline level of training to allow them to function in their acting role during a catastrophe.

Continuity of Leadership

A common trait among the most successful government entities and organizations is a sustained operating philosophy of a period of years, or even decades. Leaders at all levels of an organization or entity are custodians of this philosophy and are responsible for maintaining not only a prescribed level of performance but also a way of doing business or conducting operations in order to support the stated goals. Sustaining a standard of excellence over an extended period of time is only possible through continuity of leadership.

Information and Data Surety

Information surety in the context of GOG planning is the safeguarding of vital records, databases, operational computer systems, and other related essential information sources and systems. Governments at all levels maintain a variety of vital records that are invaluable during a catastrophic event. These records contain information such as population demographics, financial and tax bills for local businesses, and legal documents. These data sets, along with many others, provide an essential snapshot of populations, resources, and potential impacts at the local, state, regional, and federal levels. These records and their associated information are also essential to maintaining order during crisis and provide the foundation for recovery and resumption of normal activities. On a more tactical level, response- and defense-oriented networks must also be preserved during a catastrophe to preserve a nation's ability to provide for defense as well as assist in response and recovery.

Communications

Because of the nature of COG planning and operations, many different agencies from a geographically diverse area often come together as response partners. A core principle of COG requires that key decision makers be securely isolated from threats, and under certain circumstances from each other, in order to preserve the order of succession. While leaders and officials may be isolated from their departments or constituency, they must still be able to communicate in a reliable and timely manner.

Issues related to achieving interoperable communications have been documented as far back as the Oklahoma City federal building bombing in 1995. Interoperable communications continue to pose a challenge today, and communication capacity and redundancy are major issues as well. In many ways, solving the interoperability issues of the late 1990s has decreased the data capacity and redundancy of today's digital communications infrastructure.

Modern COG plans must feature communications annexes that provide for common operation but also must be have the capacity to handle double or triple the normal traffic volume or bandwidth. Additionally, as governmental agencies, private response partners, and the U.S. military start narrow-banding along the 700–800 MHz range, alternate redundant systems are still needed. These alternate systems can include narrow-banded Ultra High Frequency (UHF) and Very High Frequency (VHF) radios, as well as secured cell phones.

Above all else during a continuity of government emergency, communications must remain secure. The most diligent COG plans in the world can be rendered useless if communications between command centers and field personnel or forces are compromised, jammed, or hijacked. Communications security during a catastrophe can include a variety of measures ranging from encrypted devices, to frequency hopping or frequency skipping transmitters, to coded or cipher-based messaging. Although the latter is in direct

Case Study 1: Continuity of Government Following September 11, 2001

On September 11, 2001, the United States suffered nearly simultaneous terrorist attacks on New York City and the Pentagon, the nerve center of the Department of Defense (DoD). The National Continuity of Operations Plan was activated for the first time. The plan implementation involved the president, the vice president, up to 150 senior officials and other government workers from numerous federal departments, and other key personnel from the executive branch and legislators moving to secure locations across the country. The president, in Florida at the time of the attacks, was taken to several high-security military facilities before eventually returning to Washington, D.C. In an effort to preserve the order of succession to the office of president, several of the individuals immediately behind the vice president in order of succession were taken to separate secure locations.

Additionally, in Big Sky, Montana, more than 350 government officials and contractors were attending an emergency response conference at the time of the attacks. They included the director of the Federal Emergency Management Agency; officials from the Commerce Department, the National Oceanographic and Atmospheric Administration, and the DoD; and numerous state emergency management/civil defense directors and governors. Over the next few days, the officials in attendance, from all levels of government, struggled to establish communications and obtain situational awareness from their home offices or jurisdictions.

Although numerous exercises had been held over the years to test key functions, and at times even the entire continuity of government plan, the 9/11 attacks highlighted several issues and performance gaps to include a lack of interoperable and real-time communications between the private sector, governmental entities, and at times the DoD.

In the years following the attacks, contingency planners and agencies have sought to address these and many other challenges, with interoperable communications and multijurisdictional coordination being a primary focal point. Since its formation, the Department of Homeland Security has conducted several exercises to test continuity plans and measure the efficacy of these and other planning and performance improvement initiatives.

The United States has been in a state of national emergency continuously since September 14, 2001, when the Bush administration invoked the National Emergency Act in response to the attacks. The act, which grants various powers to the president during times of emergency and was intended to prevent a president from declaring a state of emergency of indefinite duration, must be renewed every two years. The act remains in effect, following an extension by President Barack Obama in September 2011. This underscores the gravity and complexity that COG planners face.

conflict with initiatives by FEMA and others to move away from "coded messaging," in the absence of any other method of securing communications, it must be considered.

Alternate and Contingency Facilities

Secured contingency operations centers are essential to support COG plans at all levels of government. These locations and facilities fall under one of two categories: hot sites and cold sites. Hot sites are facilities that are fully staffed and networked at all times. These facilities can host emergency or contingency operations at a moment's notice or as soon as the designated executive or decision makers arrive on site. Cold sites, by contrast, are fully capable operations centers but are not permanently staffed or ready for operations. These facilities can be brought online within a predetermined period of time after notification. Although cold sites are not staffed at all times, there is a maintenance and sustainment component to each every cold site that ensures operational and logistical readiness.

At the federal level, successful COG planning must utilize a combination of hot and cold sites in order to achieve optimal resiliency. State and local governments often lack the resources and finances to support multiple hot sites and typically rely on a single hot site with several alternate cold sites. For security reasons, the locations, classifications, and capabilities of all operations centers, hot or

Case Study 2: Continuity of Leadership in College Athletics

College athletics, specifically basketball, can be used as a model continuity of leadership model for nearly every level of organizational leadership. The lessons learned from a close analysis of two of the most successful NCAA Division I basketball programs over the past 30 years, the University of North Carolina and Duke University, are applicable to both everyday and crisis management models.

Longevity Versus Transition

A single entrenched leadership over a period exceeding 30 years does not guarantee success in the same way that four different leaders in 30 years does not guarantee failure. In the cases of Duke University and the University of North Carolina basketball programs, both scenarios have resulted in unrivaled success over the past two decades. In the case of Duke, the program has achieved four national championships, 13 Atlantic Coast tournament titles, and 12 Atlantic Coast regular season titles under a single head coach, Mike Krzyewski. In contrast, the University of North Carolina has achieved four national titles, eight Atlantic Coast tournament titles, and 15 Atlantic Coast regular season titles under four different head coaches, Dean Smith, Bill Guthridge, Matt Daugherty, and Roy Williams.

Recruiting and Retaining Leadership

At first glance, it is easy to assume that both programs' sustained success is a factor of superior "executive leadership" and attracting superior athletes; however, in both cases, both programs have sustained an elite level of operational leadership among their players. This, by far, is the most important and impressive attribute of both programs, especially considering the context of the NCAA student athlete. Student athletes are eligible to participate with a school for a period of one to four years; under certain circumstances, this eligibility can be extended to a fifth year. This requires coaches to recruit established, capable leaders, as opposed to developing them over a period of several years. Additionally, every athlete must be a leader, not just the captains. An elite athlete does not necessarily equal an elite leader.

Attracting the right talent is only half the battle. Both programs also excel at retaining talent at both the executive and operational levels. In a sport where many players stay in college only one year before leaving to pursue professional careers, both schools routinely have rosters stocked full of upperclassmen. This sustained pipeline of leadership has ensured that both programs have enjoyed systemic success with only episodic setbacks.

cold, are classified to the highest degree appropriate. Over the years, several locations in the United States have been confirmed to be former or active contingency operation centers. These sites include:

- Cheyenne Mountain, Wyoming: The home to North American Aerospace Defense Command (NORAD) and U.S. Northern Command (USNORTHCOM)
- Mount Weather, Virginia: FEMA Emergency Operations Center

In addition to fixed facilities, mobile platforms such as Air Force One and the National Airborne Operations Center are tasked with being mobile contingency and command platforms. During the 1960s, mobile platforms also included the National Emergency Command Post Afloat (NECPA), the USS *Northampton*, and the USS *Wright*.

In addition to contingency operations and command centers, governments and private-sector entities must also maintain alternate locations to ensure data protection and communications redundancy. Much like operations centers, these alternate facilities are classified as hot or cold facilities. It is common for such facilities to be present at the national or military level. Because of financial and logistical limitations, state redundancy sites are typically limited contingency communications relays for statewide radio systems. Very few city or county governments have resources to develop or maintain redundancy locations, outside a limited capacity redundant data center. City and county governments will, however, on occasion partner with the private sector to develop regional solutions for very targeted and narrow-scope systems.

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See Also: Cold Site; Data Mirroring; Data Recovery; Warm Site.

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Cooperative for Assistance and Relief Everywhere (CARE)

CARE International is a large nonprofit confederation of national members in 12 countries. CARE brings humanitarian aid to developing countries and provides help spawn social and economic progress. CARE began through a group of American organizations wanting to aid post–World War II Europe. Its base broadened so that it became a multinational nonprofit. CARE moved from delivering packages to providing other kinds of relief, education, and advocacy. CARE is one of the most respected charities in the world.

CARE was formed in the United States in November 1945 as the Cooperative for Assistance and Relief Everywhere to meet the needs of poverty-stricken people in post–World War II Europe. The organization was the effort of 22 organizations seeking to aid those in Europe. The initial efforts of CARE involved the sending of CARE Packages. The initial packages were boxes of surplus meals that had been intended for the U.S. Armed Forces who were to have invaded Japan. For $10, a box could be sent to someone who needed food in Europe. Later, CARE put together its own boxes of food, and individuals did not have to know the individual to whom the box would be sent. Eventually, the boxes of food were modified to account for the culture of the recipients, and food was supplemented with other needed items like medicine and blankets. In 1953 the organization modified the meaning of CARE to Cooperative for American Relief Everywhere. CARE Packages were sent to Europe until 1955. Thereafter, the packages were delivered to other developing parts of the world. In 1968, CARE suspended the delivery of packages, although there were some instances in which packages were sent to limited areas. Approximately 100 million CARE Packages were delivered by the organization.

CARE International was formed and became the umbrella organization for member countries. The CARE International secretariat, or headquarters, is located in Geneva, Switzerland. The secretariat has an office in New York to work with the United Nations and one in Brussels to work with European entities. In addition to the 12 national offices, there are CARE offices in many of the countries where CARE has ongoing projects. Each of these country offices is led by a country director. The secretariat, along with the board of directors, coordinates the work of national affiliates, sets policies, and helps coordinate responses to humanitarian crises. The secretariat also houses the CARE Emergency Group, which enables the organization to act quickly in emergencies that standard programs are not equipped to handle or that happen in locations where there is no CARE presence.

As CARE International has evolved, it has shifted its emphasis to fighting poverty and addressing health issues in the developing world. Empowering women is at the heart of its community-based work to provide education in health, sanitation, and economic opportunities. CARE deems girls and women as the most effective agents of change in society. The ripple, or butterfly, effect of helping one and seeing that help impact others is at the core of CARE's philosophy. CARE also provides emergency relief services to those impacted by human-made or natural disasters. CARE seeks long-term solutions to poverty issues. Sustainable food production is one of those issues. The organization works with many communities to help design effective ways to produce food for the residents. Projects are developed to help families produce more food from the land and also stress conservation of the natural resources that are crucial for continued productivity and for a healthy ecology. CARE also works to help food producers get their produce to markets. CARE advocacy includes issues related to climate change, women's empowerment, poverty alleviation, and influencing funding policies of governments related to these and other important issues.

CARE International's national affiliates are located in the following countries:

- Australia
- Austria
- Canada
- Denmark
- France
- Germany-Luxembourg
- Japan

- Netherlands
- Norway
- Thailand
- United Kingdom
- United States

CARE works with partners at local, national, and international levels. Through local partnerships with nongovernmental organizations (NGOs), and even informal locally based organizations, CARE is able to better assess the needs of the community and draw on the skills and resources of the locals. CARE is also able to add value to these local groups through training and the experience these groups gain. CARE also works through local schools and with medical personnel. At the national and international levels, CARE seeks, along with like-minded organizations, to influence government policies and funding for areas of joint concern.

In 2010, CARE USA had total income of $634 million. Approximately $525 million was spent on CARE programs during the year. Half of program funds were spent in Africa, 21 percent in Asia, 16 percent in Latin America and the Caribbean, and 13 percent in Europe and the Middle East.

In 2011, CARE International had a total of 1,015 projects in 84 countries around the world. In the months after the 2010 earthquake in Haiti, CARE provided emergency relief for 290,000 people. In that same year, 91 percent of CARE's expenses were for programs and 9 percent of the budget was spent on fund-raising and administrative costs. Also that year, 77 percent of program expenses were directed toward long-term poverty issues and 23 percent toward emergency and rehabilitation help. CARE has a Humanitarian Accountability Framework, which is a statement of the organization's desire to provide humanitarian work that is of high quality. The statement provides CARE staff with a guide to providing the kind of service desired by the organization. CARE has a system that ensures its processes, outcomes, and impacts. This ensures that lives are being impacted through the use of resources the organization has at its disposal. CARE seeks to involve impacted communities in this assessment process.

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See Also: Food Security; Global Food Crisis; Nongovernmental Organizations; Poverty; Vulnerable Populations.

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Coordination

Coordination in crisis and emergency management indicates the partnerships involving government, business, nonprofits, communities, and the public as a whole working toward mutual goals. Actually, interorganizational cooperation is a widely held ideal shared by many emergency agencies in many societies. Coordination is most likely to be achieved when organizations have pre-disaster connections, a willingness to work together to meet emergency management needs, and appropriate communication methods.

Multiorganizational coordination is essential for crisis and emergency management. Traditionally, individuals and local communities take the main role of disaster response because natural disasters are seen as the action of God. But disaster preparation and response is widely viewed as the appropriate role of government by most citizens in recent years. They expect the government, especially their local government, to take an active role in disaster and emergency management. As the emergency management department in the government is relatively small, and less powerful, a coordination and collaboration between different agencies is necessary for effective emergency response. Also, the nonroutine nature of disasters does not require a large number of full-time employees in an emergency management department, but once a major incident happens, a large amount of personnel and resources both inside and outside an emergency management department are needed and thus require multiorganizational coordination. What's more, the disruptive and dynamic nature of disasters—the negative effects of disaster always beyond the response capacity of local communities—also requires multiorganizational coordination. Finally, research evidence has proven that the command-and-control model for disaster management is flawed, and a coordination-and-collaboration model is more suitable for disaster and emergency response. Because no single department or agency has sufficient resources to deal with large-scale disaster at hand, a close working relationship and coordination among different organizations is necessary for effective and efficient disaster response, recovery, and prevention.

Most current disaster and emergency laws and policies require a multiagency coordination model. For example, in the United States, nearly all the emergency-related laws, like the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the Homeland Security Act, and the Post-Katrina Emergency Management Reform Act of 2006, encourage a coordination work model—the Federal Emergency Management Agency (FEMA) is required to work with state, tribal, and local governments; the private sector; and nongovernmental organizations (NGOs) to facilitate inclusive, multiagency, community-wide, and coordinated response and recovery effort.

In order to implement the coordination mission, several temporary or permanent organizations or positions are created. At the local level, the local emergency operation center (EOC) is the physical location where multiagency coordination occurs. The EOC can be a permanent or temporary organization directed by a full-time emergency manager or an appointed official. The state emergency operation center (SEOC) is the physical location where multiagency coordination happens at the state level. A joint information center (JIC) may be established to coordinate emergency information and other public affairs functions. The state coordinating officer (SCO) is the key person in charge of state response and recovery implementations after a disaster declaration. A joint field office (JFO) and unified coordination group (UCG) may be formed with officials from all related agencies, as well as representatives from nongovernmental organizations and the private sector. At the federal level, the National Operation Center (NOC) is the primary national hub for multiagency coordination across different federal agencies for emergency management. Unlike the EOCs at the state or local level, the National Operation Center is a continuously operating multiagency operation center.

The National Incident Management System (NIMS) in the United States was developed from the Incident Command System (ICS) and the Standard Emergency Management System (SEMS) and is a set of systems designed to standardize disaster response for effective, efficient, and collaborative incident management. It seeks to improve post-disaster operations through predisaster planning and capacity building. The NIMS not only is designed to improve interagency coordination between all levels of government but also covers all other types of responders, including private-sector and nonprofit organizations.

Intergovernmental Coordination

Two primary government systems provide examples of the following types of intergovernmental coordination: federalism and centralization.

Federalism: Federalism countries like the United States reflect the philosophy of separating the functions of government and allowing some degree of sovereignty at lower levels of government. The emergency management systems in these countries also reflect such a federalist natural. For example, localism, lack of standardization, unit diversity, and fragmentation are the main features of the American emergency management system, according to Thomas Drabek's observation of six major disasters over a two-year period. Coordination and collaboration is the principal way to deal with disaster and emergency management issues between different levels of government and varied agencies. The policies and organizations introduced above reflect the main part of hierarchical coordination in countries like the United States.

Memorandums of Understanding (MOUs) and mutual aid agreements are common means to strengthen the interagency, intersectoral, or interjurisdictional assistance and coordination. The difference between the two is that mutual aid agreements are more formal than MOUs.

Case Study: Walmart's Coordination Efforts During Hurricane Katrina

Walmart's response to Hurricane Katrina, which hit the coast of Louisiana on August 29, 2005, is a case study in public- and private-sector coordination. Immediately after the incident, Walmart initiated its emergency operations. Walmart's quick response to the hurricane showed good coordination with government at all levels, nongovernmental organizations, communities, and other private-sector companies. It also demonstrated good inner-corporate coordination.

From the beginning of the event, Walmart's chief executive officer (CEO) made it clear that all operations relative to the preparation for, response to, and recovery from the hurricane were to flow through their emergency operation center (EOC). Departments and divisions that had business unit representatives located within the EOC served as decision makers and liaisons for their respective business units. The EOC quickly developed and passed a situational awareness plan and formed a whole image for the business unit representatives there. The business unit representatives then made decisions on strategies and tactics based upon the big-picture data that had been collected. Walmart grouped its available resources into restoration, energy, systems, security, and management teams according to their skill and technology advantages to perform tasks of searching for lost employees, assessing facilities, reconstituting and restoring operations, and coordinating with government officials.

During Hurricane Katrina, Walmart coordinated closely with local agencies and communities to provide support to the victims. The restoration, energy, systems, security, and management teams worked to recover operations and mitigate further loss. The security teams worked with law enforcement agencies and the National Guard to ensure safety. They talked with the Centers for Disease Control and Prevention and state health agencies to develop health strategies. They also provided vaccinations and pharmaceuticals to emergency workers. The management teams reopened the facilities, supported hospitals and communities, and sheltered police officers and emergency services workers in their stores. The energy teams started designated generators to provide power to facilities in areas that did not have power for days and weeks. They provided generator support to power other facilities such as hotels, water treatment plants, and hospitals. Information systems teams established network and voice connectivity by setting up temporary satellite systems. Over the next few days, Walmart provided $20 million in donations, 1,500 truckloads of merchandise, food for 100,000 meals, and the promise of a job for every displaced worker.

Through a coordinated response and dedicated employees, Walmart's efforts were widely regarded as one of the most successful of all corporations in the aftermath of the disaster and set the standard for future corporate disaster relief programs.

FEMA defines the mutual agreement and assistance agreements as "agreements between agencies, organizations, and jurisdictions that provide a mechanism to quickly obtain emergency assistance in the form of personnel, equipment, materials, and other associated services." The primary objective of the mutual aid agreements is to facilitate rapid, short-term deployment of emergency support prior to, during, and after an incident. The Emergency Management Assistance Compact (EMAC) that allows states to assist one another in all kinds of disaster response is the most common interstate mutual aid agreement. It is administered by the National Emergency Management Association (NEMA) and mainly contains the Interstate Mutual Aid Legislation Model and State-County Mutual Aid Deployment Contract Model.

Centralization system: Some countries like China have a more centralized government system than a federalism regime. The emergency management systems in these countries also reflect a much stronger centralization and the coordination capacity of the central government. In 2008, a devastating earthquake hit southwest China and caused thousands of deaths. The central government responded to the catastrophe very rapidly and won praise from the public. Also, with the strong coordination of the central government, a widely covered state-county mutual aid model was implemented for disaster recovery, and this method has proven to be especially helpful. However, this top-down method is not useful for most incidents because the central government cannot be involved in most disasters.

Public and Private Coordination

In most countries, the private sector owns the majority of infrastructure and provides most products and services to the public. Also, private contractors play an important role in the disaster and emergency area. For example, many private contractors take the responsibility of debris cleaning after a major disaster. Increasing evidence indicates that coordination and collaboration between public and private sectors could improve the community's capacity to prepare for, respond to, and recover from disasters.

In the United States, the Private-Sector Coordination Support Annex of the National Response Framework is the main policy guidance for public-private coordination activities. Except for the organizations mentioned in the coordination section, some other organizations like the Private Sector Office (DHS/PSO), Office of Infrastructure Protection (DHS/OIP), and National Infrastructure Coordinating Center (NICC) are specified as the public-private coordination organizations. Private-sector organizations are required to take responsibility for their internal preparedness, including risk identification and assessment, contingency and emergency planning, etc. They are also encouraged to accept responsibilities such as information sharing with government, goods and service provision through contractual arrangements or government purchases, and pro-social behaviors (donations and volunteerism) provision like corporate citizens.

Public and Nonprofit Coordination

Voluntary agencies have a long and proud tradition in disaster response and relief work in the United States. Back in 1736, Benjamin Franklin created the first volunteer firefighting company in Philadelphia, and this was recognized as the first voluntary agency involved in disaster response work in America. Voluntary agencies are agile and less bureaucratic than government agencies, and they play a critical role in all phases throughout the disaster cycle: mitigation, preparedness, response, and recovery. However, nongovernmental organizations have limitations in resources, accountability, and coordination, and this weakness can undermine their effectiveness and efficiency as well as equitable distribution of services. Also, the preference of donors, such as that they may be more interested in immediate disaster relief rather than longer-term recovery and mitigation, can also cause problems in maximizing the outcome. Thus, the voluntary sector alone cannot guarantee a just and effective social response to disasters, but it will inevitably work alongside the government.

The Volunteer and Donations Management Support Annex is the main guidance that describes the coordination processes used to support the state in ensuring the most efficient and effective use of unaffiliated volunteers, unaffiliated organizations, and unsolicited donated goods. It states clearly that the federal government encourages state, tribal, and local governments to coordinate with volunteer agencies, community and faith-based organizations, volunteer centers, and private-sector entities through local Citizen Corps Councils and local voluntary organizations active in disaster (VOAD) members to participate in disaster preparedness activities. Also, the Emergency Support Function #6, Mass Care, Emergency Assistance, Housing, and Human Services Annex of the National Response Framework provides guidance of mass care and disaster relief in the United States. At the regional level, FEMA has Voluntary Agency Liaisons (VAL) to develop the relationship between FEMA regional offices and voluntary agencies. It plays a main connection and coordination role between federal agencies and nonprofit organizations.

The following two examples demonstrate public and nonprofit coordination:

American Red Cross and government coordination: The American Red Cross is a humanitarian organization led by volunteers and guided by its Congressional Chart and the Fundamental Principles of the International Red Cross Movement.

It has been a primary disaster relief organization that helps people prevent, prepare for, and respond to emergencies for more than 100 years in the United States.

After Hurricane Katrina, about 250,000 Red Cross workers, 95 percent of whom were volunteers from all states and territories, responded to provide services, including sheltering, food, health and emotional care, and relief supplies, to more than four million people. But the mass care needs of this catastrophe exceeded the capacity of the Red Cross. Some groups criticized the Red Cross for not providing timely mass care due to poor coordination with FEMA—they could not get access to the target victims in some areas. So, the role of the American Red Cross as a "primary agency for mass care" (2004 National Response Plan) was changed to a unique federally designated role as a "support agency to FEMA for mass care" (2008 National Response Framework).

NVOAD/VOAD and Government Coordination: National Voluntary Organizations Active in Disaster (NVOAD) was created in 1970 by seven voluntary agencies active in disasters to meet coordination needs during crises. It is a forum comprising about 50 national members and 55 state and territory equivalents with the mission of sharing knowledge and resources throughout the disaster cycle to help disaster survivors and their communities. In 1979, soon after FEMA was established, the directory of FEMA met with NVOAD membership, and then the NVOAD appointed a committee to work closely with FEMA as a response. Now, FEMA participates actively in NVOAD's board meetings, committee meetings, annual meetings, and the Annual VOAD Leadership Conference. Additionally, FEMA maintains Memorandums of Understanding with individual voluntary agencies and works closely with NVOAD members individually. Through these agreements, FEMA provides financial support, training, and public relationship development to NVOAD and VOAD members, and NVAOD encourages information sharing between members and public sectors as a response.

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See Also: Collaboration; Command and Control; Coping Capacity and Response Capability; Crisis Communications; Decision Making; Department of Homeland Security (DHS); Disaster Declaration; Emergency Management Agencies, City and County; Emergency Operations Center; Emergency Public Information; Emergency Responders; Emergency Support Functions; Federal Emergency Management Agency (FEMA); Mass Care; Mutual Aid and Assistance; National Incident Management System (NIMS); National Preparedness Goal; National Response Framework; Nongovernmental Organizations; Public Awareness and Education; Public Relations; Reciprocal Agreement; Recovery; Red Cross and Red Crescent; Salvation Army; Stafford Act; Volunteer Coordination.

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Coping Capacity and Response Capability

Crisis events present challenges to people that fall well outside the realm of normal human experience, possibly for periods of time that can range from months to years, decades, or a lifetime. This circumstance can thus require the development of new coping and response mechanisms to supplement or complement those used in more routine contexts. Furthermore, large-scale crisis events, such as natural disasters and acts of terrorism, impact people, affect communities, and disrupt the societal mechanism people normally rely on to cope with the demands of everyday life. Under normal circumstances, people are generally unaware of how interdependencies between themselves and community and societal processes (e.g., economic, cultural, political) influence how they cope with the demands of daily life. However, crisis events that create wholesale disruption across all levels of society throw these interdependencies into sharp relief and highlight a need to accommodate them within a comprehensive definition of crisis coping capacity and response capability.

The challenging and often enduring nature of crisis events results in people's knowledge and resources being insufficient or inappropriate for successful coping. People thus find themselves needing to rely not just on themselves but also on information, resources, and guidance provided by their social networks and government and nongovernmental agencies. Effective coping and response thus becomes a function of the degree to which personal, community, and societal factors interact effectively.

Effective crisis coping and response capability comprises three separate but related elements. The first is possessing the resources (e.g., knowledge, skills, financial) required to adapt to disruption and losses. The second is having the competencies necessary to identify, mobilize, organize, use, and, if necessary, obtain these resources. Finally, it is pertinent to identify the mechanisms that operationalize personal, community, and societal interdependencies to provide a comprehensive capacity to respond. This article starts with people's contribution to coping with crises.

Personal Factors

The knowledge, skills, and resources people bring to crisis events influence their coping efforts. However, the ability of people to use them in novel circumstances is influenced by the psychological competencies and beliefs they use to apply their resources to help them adapt. This is illustrated using the constructs of locus of control, outcome expectancy, self-efficacy, coping, and hardiness.

People differ with regard to their personal control beliefs. People with a high internal locus of control believe they can influence what happens to them. Such control beliefs increase the likelihood of people taking action to effectively cope with crises. In contrast, people with more fatalistic control beliefs (external locus of control) believe that life events impose themselves on them, making them less likely to take actions to cope with crisis events. Coping is also influenced by differences in how people think about events and their consequences. This is labeled outcome expectancy or response efficacy.

People who hold positive outcome expectancy beliefs differentiate between events and their personal and community consequences. This cognitive attribute predisposes people to look for ways in which they might cope with the consequences. In contrast, negative outcome expectancy arises when people believe that if the causes of a crisis are beyond their control, so too are the consequences. Such beliefs undermine coping efforts. Coping is also influenced by people's beliefs regarding their personal capacity to respond to events. This is encapsulated in the concept of self-efficacy.

As people accumulate successes in dealing with challenging events in everyday life, their self-efficacy increases. Self-efficacy increases the number and quality of plans people develop to address issues. It results in higher levels of effort and persistence in actions performed to achieve goals under challenging circumstances. In contrast, people whose life experience is characterized by relatively more failures can develop a sense of learned helplessness that hinders coping and response efforts.

Coping and response efforts are also influenced by the coping strategy used. People who use problem-focused strategies tend to confront the issues and demands they face directly (e.g., finding out about problems and developing strategies to manage them). In contrast, people who adopt emotion-focused strategies focus on expressing the emotions triggered by the crisis rather than confronting the causes of the emotions. In general, problem-focused coping facilitates more effective coping and response to crisis events.

Coping and response is influenced by hardiness. Hardiness describes people whose approach to life is characterized by high levels of commitment, control, and challenge. Commitment describes their being immersed in family, work, and community life, whereas control involves perceived control over challenging events (see internal locus of control above). Challenge is a predisposition to perceive life events as challenges rather than as threats. Such people accept that change is a normal facet of life and respond to challenges in flexible ways.

The beliefs and competencies described above increase people's ability to use resources to more effectively cope with and respond to crises. However, given the extraordinary circumstances in which they can find themselves, people may need additional competencies and resources, information, and guidance. These can be obtained from community and societal sources.

Community Influence on Coping

Faced with complex and uncertain crisis events, and when lacking all the information and resources they need to make informed decisions, people turn first to those who share their interests and values for the information and guidance they need to help them decide what to do to cope with atypical, challenging circumstances. These others can be family members, neighbors, and members of the communities (e.g., workplaces, social clubs, churches, etc.) with whom people interact regularly. They can also include representatives of civic agencies (e.g., emergency management, local government). Consequently, community and civic sources can contribute to people's coping capacity and response capability. In the context of the uncertainty associated with crisis events, the quality of these interactions will influence how people cope with and respond to crisis events.

Participating in community activities provides access to information from people likely to share one's interests, values, and expectations. Consequently, information from community sources can facilitate people's ability to understand crisis circumstances and to decide what to do. Regularly participating in activities with like-minded people provides access to additional and potentially more comprehensive knowledge, skills, and resources than the person would normally possess. However, realizing the benefits of having access to a wider range of resources is a function of the presence of several additional competencies that facilitate people's ability to use them.

The utility of collective expertise is a function of the degree to which communities seek to include all members and the degree to which people actively participate in community activities (the community competence construct includes measures of inclusivity, participation, and social support). This illustrates mechanisms that operationalize the interdependencies between people to create a coping and response capability in which the whole becomes greater than the sum of its parts. However, while participation provides access to a wider pool of knowledge and expertise, deciding how to use this asset to deal with unfamiliar crisis events and identifying resources not currently available within community contexts, but required if people are to cope, requires additional competencies. These include identifying the specific implications crises have for them and where they live and work, in addition to what can be done to manage consequences.

Collective efficacy describes community members' ability to assess their capabilities and resource needs in relation to challenging tasks, define their goals, and develop plans for using resources to achieve goals. Community competence includes components that describe how coping and response to crisis events can be facilitated if community members can articulate their problems and needs and possess mechanisms that assist them to represent their needs to the societal agencies and businesses that can provide the information and resources they need to enact their plans and adapt effectively. Comprehensive coping and response capability does not end here.

Given the atypical nature of the demands posed by crisis events, community deliberations could identify new information and resource needs that cannot be met within existing community contexts. Being able to articulate and represent those needs to the agencies and businesses that can meet

Relief workers give medical supplies to community members along flooded routes during the unusually heavy 2011 monsoon season in regions of Thailand, which caused the worst floods in 50 years. According to Nuttapong Wongjindanon, a Centers for Disease Control and Prevention epidemiologist, community members demonstrated coping capacity despite been frustrated: "There are still signs of people sticking together and helping each other out.... People should not just wait for help from local authorities."

these needs is important. However, if agencies and businesses do not respond in ways that provide the specific information, advice, and resources communities need to enact plans to meet their specific needs, coping and response capability will be compromised. Consequently, effective coping and response is a function of the degree to which civic and business agencies empower people by acting toward them in ways that help meet the specific needs of each community.

Community–Societal Interdependence

Empowerment describes citizens' capacity to gain mastery over their affairs and confront crisis events by being supported by agencies rather than having solutions thrust upon them. Empowerment promotes the equitable distribution of resources (i.e., material, knowledge) in ways that facilitate the development of people's capacity to confront the local issues posed by crisis events. The quality of the relationship between people and agencies is influenced by the degree to which people believe that their relationship with formal agencies is fair and empowering (e.g., agencies are perceived as trustworthy and acting in the interest of community members). When this relationship is not perceived as fair, the consequence is a loss of trust in the agency (the source of information). Trust is thus an important determinant of the quality of any relationship in which information is exchanged and appraised, and decisions made under conditions of uncertainty.

Empowerment reflects the quality of reciprocal relationships between community members and the societal agencies that provide resources, information, and advice. The more citizens perceive

Case Study: Coping and Capabilities During the 2009 Australian Wildfires

Wildfires in southeastern Australia in 2009 created circumstances that required communities to develop new approaches to responding to and coping with the disruption and loss that occurred, including developing new relationships with communities, government, and businesses.

A need for new coping approaches arose as a result of the need to look after oneself and one's family before engaging in activities with others. Individual coping was facilitated by accessing information that advised on physical and psychological health issues that could arise and the strategies to cope with the immediate and medium-term impacts. The effectiveness of this approach was supported by developing supportive relationships within communities. This provided the foundation for securing social support and the development of community coping and response strategies to deal with community-wide issues.

The emerging approach to confront collective issues involved the development of community planning processes established to elicit and communicate information and allow people to hear about and contribute to ways of responding to their diverse challenges. These processes facilitated consultation with as many people as possible within affected communities in order to identify both the issues people faced and the coping and response strategies they could use to deal with them. Such extensive consultation led to high levels of initial participation. However, resourcing and time issues meant it was not possible to act on all suggestions. This resulted in conflicts when people felt their ideas were being ignored and threatened to disrupt effective community response. To circumvent this, members developed processes for clarifying and prioritizing issues, maintaining community integrity by making explicit the need to prioritize actions in relation to factors such as resource availability or the time it would take to act and the processes used to make these choices. A key message was stating that their not being acted on did not lessen the relevance of ideas or their possible future use.

The range of response issues necessitated developing ways of coordinating response activities. This led to the selection of leaders from within the community, with different individuals taking responsibility for different activities (e.g., liaison with government, community-building processes). Later review of this process identified the need for training and support for leaders. Letting this happen in situ reduced the initial effectiveness of the process and resulted in people's responsibility leading to exhaustion and burnout. The election of leaders was important, as it provided them with legitimacy both within the community and in the eyes of government and external businesses.

Elected leaders provided communities with a voice and connection to government and helped government see that leaders were representing the whole community. Elected leaders provided a mechanism by which bottom-up, community-generated ideas could be proactively represented to government agencies and provided a conduit for maintaining collaborative relationships with government and businesses. It also emerged that while businesses were often interested in offering assistance, they did not know how to do so. This led to the realization of the need to be proactive in dealing with the commercial sector to ensure that resources could be procured when needed.

Although the development of individual and community coping and response strategies had many benefits, it also incurred certain costs. The benefits included developing social support networks and fostering a sense of control and resilience. However, several problems emerged, including the need to accommodate differences in how people cope and the ability to meet needs that present at different times. Ensuring that members of pre-existing groups and committees were given roles and not usurped by new groups specifically associated with the crisis was important to sustaining a sense of community. It was also important to develop management and negotiation skills to manage the consultative processes. Other lessons included preventing people becoming overcommitted and neglecting personal and family needs over time, and implementing processes for membership and leader succession, limiting periods of involvement, and providing opportunities for people to withdraw if necessary.

their needs as having been met through their relationships with societal agencies and institutions, the more likely they are to trust them and the information they provide. In this way, empowerment and the trust it engenders facilitate the ability of people and communities to cope and respond to crisis demands.

The capacity to cope with and respond to atypical crisis events will not develop by chance. Developing these outcomes requires a conscious effort on the part of people, communities, and societal institutions to develop and maintain the resources and processes required to ensure that coping can happen and that it can be maintained over time. Maintaining a capacity for coping over time is especially important for infrequent threats that pose unique challenges for effective response.

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See Also: Crisis Communications; Disaster Recovery; Emergency Public Information; National Response Framework; Resiliency.

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Cosmology Episode

Crises are ontologically challenging events that engage individuals in a high degree of uncertainty. In severe crises, the unfolding events may unravel an individual's or group's existing beliefs about how the world works. A cosmology episode is a state of mind that occurs during one of these extreme periods of ontological distress. In a cosmology episode, an individual or individuals may lose the ability to rationally make sense of a situation. Their surroundings are no longer acting as expected, and their existing ontological assumptions are disrupted.

Karl Weick, an organizational communication scholar, introduced the term *cosmology episode* into the crisis literature from philosophy. The philosophical study of cosmology is a macroscopic view concerned with understanding the structure of the universe. As individuals engage in their daily lives, they operate under a cosmology that events will unfold in space and time in an orderly manner. When a crisis occurs, these individual or shared cosmologies are confronted with a new reality that is both unfamiliar and dangerous. According to Weick, "A cosmology episode occurs when people suddenly and deeply feel that the universe is no longer a rational, orderly system. What makes such an episode so shattering is that both the sense of what is occurring and the means to rebuild that sense collapse together." Thus, both the ability to understand the situation and the ability to use reason to create a new order are lost during a cosmology episode.

In the field of crisis management, the concept of a cosmology episode is useful for practitioners to understand how both emergency responders and the population they are helping may react during a crisis. The concept of a cosmology episode has been applied within a variety of theoretical lenses such as sense-making and chaos theory to explain the loss of rationality and the struggle for sensemaking during an overwhelming crisis situation.

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See Also: Bounded Rationality; Cascading Crisis; Chaos Theory; Chemical Risk; Decision Making, Theories of; Shelter-in-Place; Uncertainty.

Case Study: The 2002 Minot, North Dakota, Train Derailment Cosmology Episode

When a train derailed in Minot, North Dakota, at 1:30 A.M. on the still and frigid morning of January 18, 2002, approximately 250,000 gallons of anhydrous ammonia were released from the wreckage. Instead of dissipating into the atmosphere, the deadly chemical interacted with the cold temperatures and created a dense fog that settled within the community that was located below the tracks in a valley. The fog was poisonous to breathe and would burn moist areas of the body such as the eyes and lungs. Additionally, the combustion engines of vehicles were largely unable to work in the fog, so officials were very limited in direct notification, evacuation, and rescue attempts. As officials began to respond to the situation, they were confronted with several emergency notification system failures that did not allow them to get information about the derailment out to residents.

The community's small 911 system was immediately overwhelmed, and the vast majority of residents were met with a busy signal. The community's outdoor emergency sirens were activated, and a voice message instructing residents to stay indoors was deployed. However, the sirens did not work well in the dense fog, and residents could not understand the message. Instead, the sirens awoke many residents who were sleeping (which may have been best in this situation), thereby making the situation even worse.

The local media were also not helpful in informing residents. All the area's radio stations were owned by a single corporation and housed in a single building. The Emergency Alert System and the older Emergency Broadcast System both failed, and only a single individual was running all the stations. When local officials tried to call the station on a land-based telephone, the radio operator was in a soundproof booth and did not answer the call. Officials were not able get through to the station again because frightened residents began jamming the phone lines to the station.

Additionally, the local television station, which was located in the fog, was off the air for the evening, even after officials were able to contact station representatives at their homes, they were unable to get the station and notify residents.

The derailment did not affect the community residents equally; it caused power outages to parts of the community and even destroyed some homes directly. Residents farther from the derailment had more time to react to the situation than those living close to the tracks. A multitude of variables made the situation better or worse for individuals affected by the crisis. What was common to the vast majority of the community was that they had no idea what was happening or what to do to preserve their safety.

As residents struggled to make sense of the situation, the actions one typically takes in an emergency either made the situation worse or created more questions. When residents were awakened by the emergency sirens, many of them opened their doors to see what was going on outside. This action let the dangerous chemical into their homes. When they turned on the television, it was off the air. When they turned on the radio, normal programming was playing like nothing was out of the ordinary. While this is what individuals who had power to their homes went through, those without power faced an even scarier situation.

At every turn, the normal cosmology of residents was met with bizarre circumstances, irrational calm, lack of information, and overwhelming uncertainty. The best way residents could have reacted to the situation was to keep their doors shut, turn off their furnace (the temperature was below zero), go into the bathroom, place a wet towel under the door, turn on the shower, and shelter in place; however, without official information, these actions were not within the reasoning faculties of a terrified community. As a result, many residents had a cosmology episode and tried to flee the situation.

Many residents were able to drive their cars out of town through the less dense areas of fog. However, others became trapped in their vehicles as the fog disabled vehicle engines. Others became disoriented, could not find the road again, and crashed into things such as their neighbor's house. Others tried to find better shelter and tried to run to a neighbor's house. As a result, many residents were seriously injured, and one resident died.

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Coupling

Crises do not emerge out of the blue. More often than not, in retrospect, we are able to acknowledge a series of events that led a specific crisis to happen. Exogenous and endogenous factors are usually combined in the enactment and development of social crises. Although some crises might be produced by a single technological malfunction, a natural disaster, a human mistake, or a planned misconduct, other crises can be the result of all these factors combined in unexpected and hazardous ways. It is important to note that the effects produced by a crisis cannot be reduced to the elements that compose it.

To understand how a social crisis is produced and to find ways to manage it effectively, it is important to identify the elements involved in the crisis and the ways in which these elements are linked to each other. The components that take part in a crisis may be human in nature (e.g., individuals, groups, organizations, or larger communities) or nonhuman (e.g., technological devices or environmental conditions). The ways in which the constitutive elements of any given crisis are "coupled" will largely determine the crisis's nature and scale of impact.

Let us propose an example. Multiple factors were involved in the loss of the space shuttle *Challenger* in 1986. The incident was instantly captured by the media. A few seconds after the *Challenger* was launched, thousands of eager spectators were able to see the smoke trail left by the disintegrated spacecraft and, with it, the vanishing of hopes built around this nationwide project. How did this happen? How is it possible for such a catastrophic event not to be anticipated, even by experts? Mixed signals provided by environmental conditions, technological failures, political pressures, and organizational mistakes led the highly trained engineers and scientists at the National Aeronautics and Space Administration (NASA) to make a wrong decision that, in this case, led to fatal consequences. Probably, none of these factors, by itself, was particularly harmful; it was the combination, or "coupling," between all of them that led to a disastrous outcome of incalculable qualitative and quantitative losses. This example shows that the higher the number of components involved in a disaster, the higher the level of complexity of the disaster and the more difficult it is to identify a single factor as responsible for its occurrence.

In addition, the kinds of couplings, or "linkages," between the components involved in a crisis play a crucial role in determining the nature and scale of its effects. We distinguish here two types of couplings: loose or tight couplings. The term *loosely coupled* is commonly used to describe complex assemblages whose components are only weakly connected; that is, they interact in diverse ways and are capable of more autonomous actions. A research consortium that lacks a legitimate authority and that promotes an equal participation among its members could be seen as an example of a "loosely coupled" arrangement or organization. The fact that this kind of organization does not stipulate a unique way of functioning might give rise to a higher fluidity of ideas, with more flexibility to test and improve those ideas and possibly open higher opportunities to make mistakes, than would be encouraged under a highly strict form of organization. The term *tight coupling*, in contrast, refers to highly interconnected parts in which the malfunctioning of some parts may lead to major crises or disasters. An army organized in a highly hierarchical form, for instance, could be seen as an example of a tightly coupled organization, in which slight changes (e.g., failure to convey or obey a command) might have strong repercussions in the system as a whole. In this kind of organization, we can imagine a superior saying to his subordinate: "Here, there is only one way of doing things." Any deviation from the formal line of command may give rise to mistakes or disasters of incalculable dimensions that can put at risk the well-being of all organizational members, especially under situations of high pressure.

These examples suggest that failures may be more difficult to manage when the interacting components of a crisis become more and more interdependent. This could happen because the opportunities to find solutions for any given problem become more and more restricted. In other words, the group, organization, or community that is being affected by the crisis becomes less capable to react and to respond to adversity in more flexible and creative ways. An insightful study of the case of the *Challenger* launch decision discussed above found that the systematic condensation of information within NASA allowed highly complex evidence to become more and more manageable, yet at the same time obscuring conflicting elements that were critical in evaluating the launch of the spacecraft. Therefore, while summarizing the data available allowed the group at NASA to make a decision, it did so at the expense of masking important pieces of information that could have radically changed the course of the decision making as well as the after-effects.

In summary, to effectively assess, analyze, manage, and resolve crises, we need to take into account not only the factors involved in the crisis but also the interactions between these factors; irrespective of crises being large or small, expected or unexpected, or organizational, business, community, or political. Both the constitutive components and the relationship between these components play a crucial role in shaping a social crisis and its impact. On one hand, the concept of "coupling" reminds us that the interconnections between the elements of a crisis matter when examining the nature and possible causes of crises as well as when trying to find solutions to crises. On the other hand, the notions of "tight and loose coupling" invite us to turn our attention to the types of interconnections between the elements that take part in a crisis, that is, the level of interdependency between these elements and the opportunities that they may open to make failures more or less likely to happen or more or less difficult to deal with. Crises do not emerge out of the blue. When analyzed in retrospect, we can usually identify a series of minor mistakes that were catastrophic in combination or perhaps an impossible-to-predict incident that happened just in the wrong moment.

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See Also: Cascading Crisis; Chaos Theory; Command and Control; Incidents Versus Crises; Information Asymmetry; Interdependence; Nonlinearity; Normal Accident Theory; Normalization of Deviance; Risk Assessment.

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Credibility

Credibility refers to the trustworthiness and believability of a source or message. Classifications of credibility are different among disciplines and types. Credibility is constructed of many smaller interpretations such as integrity, likability, reputation, reliability, accuracy, consistency, authenticity, plausibility, and honesty. In other words, credibility often ebbs and flows based on perspective. A person, organization, message, or datum is fully credible when it has predictive value. Thus, full credibility is linked to the predictability of honest correctness, which is especially important during crises. Organizations or individuals that are not perceived to be truthful may have their messages rejected by the publics they are attempting to reach.

Types of Credibility

Statistical and scientific credibility refer to the extent to which a researcher can rely on a data set. Whereas statistical integrity denotes trustworthy and valid numerical data, scientific credibility refers to the reliability of rigorous research and data outcomes. In scholarly circles, one way to accomplish this level of credibility is by submitting work to undergo the peer-review process, in which other experts read, critique, and sanction method application and findings.

Source credibility refers to the believability of a speaker or communicative source (e.g., newspaper, network news, radio program, magazine, scholarly article, etc.). Aristotle claimed that effective persuaders appeal to audiences through logic (logos), ethics (ethos), and emotion (pathos). An ethical appeal is possible only if the source and message possess character and goodness (i.e., credibility). A source is credible when perceived as competent and demonstrating character. Source credibility is commonly conceptualized as honest expertise, which entails extensive subject knowledge and trustworthiness. There are endless varieties of source credibility, including media credibility, newspaper credibility, supervisor credibility, corporate credibility, brand credibility, and spokesperson credibility.

Experts in public speaking and persuasion detail three kinds of credibility that speakers and organizations can attain: initial, derived, and terminal credibility. Initial credibility is the authority or trustworthiness ascribed to a speaker before he or she delivers a message. Initial credibility is connected with a person's educational success, career achievements, organizational reputation, professional attire, preparation, visual and nonverbal cues, and any other information an audience perceives before the speaker begins. Derived credibility denotes the level of believability a speaker maintains or earns throughout the message-sharing process. The degree to which a speaker provides a lasting impression of integrity and competence is known as terminal credibility. Terminal credibility is the composition of both initial and derived believability. Initial, derived, and terminal credibility are assessed by audiences or stakeholders through both subjective and objective means. Credibility is based more on subjective interpretations than objective methods, since trustworthiness is often described as a "gut feeling" or "sense." Some amount of credibility is assessed objectively, like speaker certifications or facts and messages that align with the listener's confirmed knowledge.

Building Credibility

Credibility is created among audiences, communities, and stakeholders through evidence and persuasive tactics. First, evidence bolsters credibility through the use of supporting materials. Providing logical support for an argument adds to a speaker's expertise. Similarly, personal experience also provides credibility because real-life involvements enhance a speaker's perceived authenticity. Second, speakers who formally establish credibility through the introduction of their title, degree, expertise, or life experience derive believability from audience members. For example, the Centers for Disease Control and Prevention (CDC) often invites high-ranking experts and officials at their agency to speak at press conferences. Prestigious titles and scientific knowledge enhance a speaker's credibility and, therefore, a message's believability. Finally, timely charisma and passion influence audience perceptions of trustworthiness. Speakers who demonstrate excitement and conviction for their topic seem credible to listeners. Martin Luther King, Jr. (MLK), for instance, was famous for his passionate public speeches during the civil rights movement. MLK's speaking dynamism added to his credibility, the effectiveness of his message, and possibly the revolution of racial integration across America.

Alarmingly, numerous studies have correlated physical attractiveness and likability with credibility. This means that spokesperson appearance can play a role in audience perceptions of message believability. Engaging speakers appear sincere, and attractive speakers appear truthful, thus earning audience perceptions of competence and character. This phenomenon accounts for why many companies hire winsome spokespersons and beautiful models as product endorsers. Arguably, the intentional use of attractive speakers in crisis response situations could be considered unethical, as it would mean an organization is relying on perceived attractiveness for credibility rather than on the truthfulness of the message.

Credibility and Crises

Trustworthiness is key for effective communication and crisis management since noncredible messages are disregarded by stakeholders and publics. Crisis communicators must strive to be credible spokespersons before, during, and after a crisis event. If an organization has a questionable reputation before a disaster, the company's crisis response messages will be dubious. However, pristine reputations enhance an organization's credibility during the crisis management process. Credibility contributes to effective crisis communication and, therefore, can operate as an antecedent indicator of crisis resolution. In other words, responsible organizations must strive for transparency and authenticity—attainable through open and honest crisis communication. The National Center for Food Protection and Defense (NCFPD), a Department of Homeland Security center of excellence, outlines best practices in crisis response. Many of the best practices correspond with notions of credibility, for example, (a) collaborating with credible sources, (b) communicating with compassion and concern, and (c) demonstrating honesty and openness. Effective crisis management requires speaker, message, and organizational trustworthiness. Thus, credibility is paramount in the pre-crisis, crisis, and post-crisis phases.

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See Also: Centers for Disease Control and Prevention (CDC); Crisis Communications; Emergency Public Information; Pre-Crisis Training and Planning; Public Awareness and Education; Public Image; Public Relations; Reputational Risk; Scapegoating.

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Crisis, Definition of

Crisis may be defined in several ways, depending on the context and the field under consideration. According to the Merriam-Webster online dictionary, a crisis is a crucial and unstable state of affairs with a possibility to bring about a decisive change. In a more general sense, a crisis is mostly an abrupt and unexpected negative change creating a critical, dangerous, and unstable situation at the individual, group, organization, or community level.

Crises are often characterized by disruption of normality and steadiness of processes, thus creating chaos of various degrees. Most of the time, crises emerge suddenly; however, they can also be in the form of a long process requiring long-term solutions. Because crises have the potential to create a chaotic environment, they tend to limit skills and capacities present in noncrisis and routine situations. Accordingly, as Matthew Seeger, Timothy Sellnow, and Robert Ulmer state, because crises are unexpected and nonroutine events, they first of all result in uncertainty. Uncertainty, in turn, is a situation with unprecedented characteristics that make it difficult to resolve the crisis immediately. In most general terms, uncertainty is when actors involved in crisis cannot appeal to a certain solution tool due to lack of sufficient decision-making capacity.

Decision-making capacity itself is dependent on several factors, one of which is time pressure. Actors involved in crises are mostly bounded by limited time for resolution, because delayed solution may bring about a deepened or permanent crisis situation. In addition, crises impact decision-making capacity in terms of information required to make high-quality decisions. In this sense, crisis actors generally have limited or no relevant information to make good decisions. Even in times of abundant information, the time pressure related to crises does not allow for detailed and long-run analysis of that information, thus making crisis actors suffice with limited information at hand. For this specific reason, crisis situations are also characterized by heightened risk—a possible failure to make well-informed and satisfactory decisions. In this regard, actors involved in crisis may face unexpected or unintended results that may be consequential in determining the failure or the success of the crisis resolution process.

The risk is also evident in inability to retain or requirement to change the previous situation if the crisis is to be managed successfully. In fact, many scholars and crisis management professionals state that crises are an opportunity to learn. Kathleen Tierney and colleagues state that from an organizational point of view, crises are a chance to find mistakes in the system, fix them, develop redundancies for backup purposes, and strengthen the capacity against future crises. This view about crisis is similar to the description of crisis in an edited book by Arjen Boin and colleagues, according to which crisis serves two many purposes if seen as an opportunity. First, it tests the resiliency of the system, society, etc., namely, how strong it is against unexpected problems and unintended flaws. Second, it tests leadership capabilities of those very structures or systems, thus presenting an opportunity for political change.

By this token, crises can be seen as an opportunities for change. Change is deemed necessary because crisis is seen as a result of some sort of incompatibility that cannot be prolonged anymore. The word *crisis* in the Chinese language is expressed by two hieroglyphs standing side by side, the first meaning "danger" and the second meaning "opportunity." Thus, crises should not be always seen as problematic cases; rather, actors involved in crisis should direct their efforts toward elimination of incompatibilities and flaws in systems, structures, or relationships.

Although crises can be of an interpersonal nature, they can also be at the organizational, community, or international levels. The best-known types of crises are those related to economy, demography, environment, security, and natural and human-made disasters. A global food crisis and a diplomatic crisis between two states are two different examples of crises. Without doubt, such variety of crises requires different crisis management tools, skills, and capabilities that are nontraditional and nonroutine in nature. The scope and nature of crises are the main determinants of the crisis management approach.

Depending on the field or discipline, the word *crisis* may be used interchangeably with the word *emergency* or *disaster*, where the former is more general and the latter is more specific. Whatever the term, the main idea is that there is an anomaly to be fixed. Successful crisis, emergency, or disaster management, thus, is characterized by reestablishment of previous normality, whether through change or without change.

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See Also: Disaster, Definition of; Disruption of Organizations; Emergency, Definition of; Environmental Contamination; Global Food Crisis; Resiliency; Uncertainty.

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Crisis Communications

Crisis communication is a process, not just communicating a single message, to a single group, or at one point in time, and as T. E. Drabek points out, it is very much a social process. It is interactive and consists of multiple messages extending often over very long periods of time and changing conditions, and designed for many different groups (by language, age, and other demographic characteristics), places, and decisions or actions. The process needs the support of management—crisis management—across its many stages from prevention through response and recovery. Management and communication frameworks in noncrisis environments are an important and integral foundation for communicating when a crisis emerges. Crisis communication has to begin before a crisis occurs.

A central goal of crisis communication is to reduce risk through individual, group, or institutional action. Decisions or actions are usually a prerequisite to identifying and implementing communication strategies. Some specific communication objectives in catastrophes include the following:

- Reducing exposure to the risks through timely, accurate, and appropriately disseminated or targeted information
- Guiding people in the high risk/exposure areas to safe places
- Keeping people away from entering the area
- Adopting and implementing protective action such as vaccines, shelters, etc.
- Connecting supplies and services with the people who need them
- Reducing fear and anxiety

Communications are influenced by crisis characteristics and human factors. Communication is shaped by characteristics of crises that include urgent action and decision making in a highly uncertain and complex environment created by constantly changing or dynamic information, and variations in effects from place to place and individual to individual, even for the same crisis. These multidimensional needs require coordination that ultimately expresses itself in communication. Human perceptions, attitudes and behavior, and human settlement patterns and trends influence receptivity to communication and how people respond in disasters as a guide to risk reduction and protection of life, welfare, and property.

Cases of successful and unsuccessful crisis communication are first presented to illustrate how timing, accuracy, and capacity to communicate influence outcomes, followed by foundations of communication in human perceptions, attitudes and behavior, and human settlement patterns and trends, and finally, communication strategies based on lessons learned and theories of human behavior.

Perception, Attitudes, and Behavior

Many fields such as social psychology and risk management address how communication motivates and influences human behavior in crises. The common sender-message-receiver model now incorporates behavioral dimensions such as the M. Lindell and R. Perry Protective Action Decision Model (PADM). The perception-attitude-behavior relationship is complicated by the lack of correspondence between people's beliefs or what people say they would do and their actual behavior. Certain behavioral tendencies and barriers to processing information have been identified. People process communications and the information they contain in many different ways, using as a guide their experience, information from other people, their senses, and their ability to recognize patterns. Examples from theory are given below.

B. Fischhoff, P. Slovic, S. Lichtenstein, S. Read, and B. Combs emphasize that people accept risks that they personally control (such as driving a car rather than air travel) undertake voluntarily, and consider familiar and common, chronic or ongoing (not immediate and nonfatal). They accept risks that they or science know with certainty.

Information expressed as numbers can be problematic for some people, and Peters and colleagues describe the numeracy concept as understanding numbers. Numeracy is related to other problems that affect action. People have limitations on the amount of information they can process and can become overwhelmed by negative stimuli. Slovic's research (2010) refers to this as "psychophysical numbing," arguing that people feel strongly about harm to an individual but cannot grasp genocide, where large numbers of people are involved; that is, they undervalue large

Case Studies in Unsuccessful Communication

In the latter part of the 20th century and the early 21st century, record levels of crises occurred worldwide from natural hazards, accidents, and terrorist attacks, testing the limits of crisis communication, as summarized by R. Zimmerman (2012) based on U.S. agency information. Timeliness, accuracy of communication, and communication capacity and capability to deliver messages to connect supplies and services with those in need are critical to reducing the adverse outcomes of crises, and selected cases below are organized according to these three areas.

Accuracy of Messages

In very sudden, unexpected, and rapidly emerging catastrophes, some with little precedent, messages were inaccurate or not given at all due in part to an inability to assess the situation given the difficulty of obtaining or understanding information.

As mentioned earlier, messages are targeted to actions or decisions. Evacuation is one common decision in crises that requires timely and accurate information—whether, when, and how it is to be done. Communications go hand in hand with those decisions. Some cases that illustrate communication accuracy in evacuations are summarized below.

In the Tohoku earthquake in Japan on March 11, 2011, the Fukushima nuclear power plant failures were associated with messages as to where people should evacuate. N. Onishi and M. Fackler indicate that people were told to evacuate to the north, since winds were blowing to the south, when, in fact, information that these people didn't have showed winds blowing to the north, resulting in people relocating to contaminated areas.

In the 9/11 terrorist attacks, the 9/11 National Commission identified messages from some designated safety officials that New York building occupants should stay in their offices or move away from fires, a type of shelter-in-place strategy used in some emergencies but not where a total building collapse is expected to occur, a condition that was either not known or not expected at the time.

In the L'Aquila earthquake of 2009 in Italy, H. Fountain's review points out that people were told by some officials that it was safe to stay where they were; several hundred people perished.

Timing of Messages

Delay in the delivery of messages can potentially vastly increase casualties and other impacts.

In the Virginia Tech sniper shootings of April 16, 2007, as reported by Reuters, a fine was issued under the Clery Act [Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act or 20 U.S.C. § 1092(f) of 1990] by the U.S. Department of Education because university officials delayed university-wide warnings of the attack for two hours as they followed a lead, resulting in 32 deaths and more injuries. Reuters reported that as of March 31, 2012, the fine was overturned. The Haiti cholera epidemic following the January 2010 Haiti earthquake was confirmed in October by the U.S. Centers for Disease Control (CDC); military missions brought in for assistance were thought to be the cause. Timely communication of epidemiologically based warning signs such as the existence and rate of emergence of the disease to enable the population to avoid further exposure did not prevent what the World Health Organization/Pan American Health Organization (WHO/PAHO) estimated as about 7,000 deaths from cholera and more than half a million (515,699) cases toward late 2011. A major obstacle to communicating its existence and extent is that, according to the WHO/PAHO and the CDC, most of the infected people do not exhibit symptoms.

Communication Capacity for Supplies and Services

Communication capacity within and among agencies and with the public connects supplies and services to people in emergencies. The ability to communicate effectively with suppliers to match supplies with need is a major challenge. When abundant supplies are provided but are not what is needed, the imbalance becomes a disposal problem. The ability to control voluntary contributions, for example, is a major management problem.

The New York City snowstorm of December 26, 2010, was an unusual blizzard, characterized

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by the National Oceanic and Atmospheric Administration (NOAA) as the sixth-largest (in Central Park) since the 19th century. As summarized in part by Zimmerman (2012), the New York City Council hearing January 10, 2011, New York City's report by Elizabeth Weinstein and Skip Funk, and the MTA Office of the Inspector General reported deficiencies in communication with respect to the inability to declare a state of emergency, the inability of snow removal vehicles to communicate with one another due to insufficient equipment, overloading of existing communication channels, the absence of geographic information system (GIS) equipment to locate and deploy the vehicles, and the inability to communicate with workers to enable them to get to the vehicles. According to the MTA Inspector General's report, deficient public transit system communication systems and operational procedures also contributed to continued deployment of transit vehicles during the storm that were immobilized, stranding passengers; these communication deficiencies included problems with internal communications linking bus operators, dispatchers and road response units for vehicle tracking and response to disabled vehicles external communications with passengers that were delayed, inconsistent, or incorrect; and communication equipment failures. Ultimately, New York City increased the availability of communication equipment and made other organizational and procurement changes. As Zimmerman (2012) concludes, the city had other chances to improve these conditions with other snowstorms that followed in January 2011 and the extensive evacuations in connection with Hurricane Irene.

According to a 2011 National Research Council report, the December 2004 Asian earthquake and tsunami that killed more than 200,000 people revealed deficiencies in the notification of the onset of the tsunami and led to the development of an extensive tsunami warning center structure.

Based on accounts from Todd Litman and others, Hurricane Katrina of 2005 exemplified the failure of communicating to people where they could obtain supplies and services both before and after the hurricane; in some hospitals, people were told to wait for emergency personnel to help them leave, yet none arrived; and people who made it to shelters found it difficult to communicate with suppliers.

numbers. He uses a survey to argue this in which the more people affected, the lower the dollars per capita were granted to support them. In this context, he also brings in the concept of affect or quick feelings and that people cannot grasp numbers emotionally.

Slovic, Fischhoff and Lichtenstein, and A. Tversky and D. Kahneman identify some of the biases in the way people process information: for example, underestimating large risks and overestimating small ones, called "availability." In earlier works, Tversky and Kahneman as well as Slovic, Fischhoff, and Lichtenstein identify "anchoring," or the influence of previously held values on current beliefs. Education may not always overcome these beliefs. Prior experiences also can influence people's attitudes toward risk and defensive actions they are willing to take to reduce risk, as E. Lichtenberg and Zimmerman showed in the context of farmer behavior toward the risks of pesticides.

Individual, group, and cultural characteristics such as age, gender, race, ethnicity, and income have been related to variations in risk perceptions, for example, traced by J. Flynn and colleagues in a 1994 paper for numerous threats.

According to social psychologists, biases also occur in people's ability or willingness to adopt protective action (evacuation to prevent injury and loss of life, insurance to reduce property losses) before, during, or after a catastrophe.

A number of other human behavioral concepts are directly significant to communication. "Mental models" are a composite of people's knowledge, experiences, and preferences that they bring to new situations, and can change over time, as M. Morgan, B. Fischhoff, and A. Bostrom have explored. The concept of "social amplification" set forth by R. Kasperson and colleagues emphasizes that risk experiences and heightened perceptions of risk are shaped by perceptions, technical details of events, and information, and are understood when all of these factors are integrated or conceptualized in the same context.

In crises, people tend to seek information and other people for information and support. The R. Zimmerman and M. Sherman study of 9/11 survivors in New York City reported that half of the people leaving Towers 1 and 2 lingered to seek information and people, and the other half left immediately. Other studies have shown that people have certain predilections toward whom they seek information from. Trust is one of the strongest factors that relate to beliefs about risks, as Slovic has shown, and whom people are likely to listen to. People tend to obtain information from their peers and use sources with which they are familiar.

What, How, and When to Communicate

The study of communications, especially as warnings, encompasses when and how to warn. One important aspect of when to warn is the identification and communication of precursors. J. Phimister, V. Bier, and H. Kunreuther identify accidents in which the causes were known but not acted on. Hindsight takes over after a catastrophe, and precursors abound in many different ways. In catastrophic earthquakes, precursors are often evident in the form of historical trends in earthquakes in an area. According to the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS), prior to the March 11, 2011, Japan earthquake, Japan's location in a high earthquake-prone area, the "ring of fire," was well known, and earthquakes were registered near that date. T. Litman describes how New Orleans was forewarned of the dangers in a community dependent on transit. The question remains as to whether communicating prior trends makes it easier to communicate a need for risk-avoidant behavior, in the form of relocation, preparedness, and so forth, that people would act on.

Government agencies, to simplify hazard communications, rely on common integer or logarithmic scales, usually with under a dozen categories, accompanied by a verbal description of expected damages for each category. Examples are the USGS's use of the Richter and Mercalli Intensity Scales for earthquakes, the Volcano Explosivity Index, the Sieberg Tsunami Intensity Scale and NOAA's Saffir-Simpson Hurricane Wind Scale,

Case Studies in Successful Communication

In Japan's Tohoku earthquake of March 11, 2011, NY1 newsreporter Dean Meminger reported that some school children were saved by having experienced emergency drill procedures, though in other cases, emergency warning exercises can lead people to ignore them.

A report by the U.S. Department of Transportation's Volpe Center, headed by project manager Allan J. DeBlasio, describes the rapid response of transit systems after the 9/11 attacks in New York City. They describe how a train operator becoming aware of the impact communicated to others within a minute, resulting in the commencement of emergency procedures. The Port Authority Trans-Hudson (PATH) system acted similarly; within a half hour, shutdowns of roadways and airports followed, and within two hours a system-wide shutdown of subways and the PATH occurred.

Researcher Rae Zimmerman summarized how utilities, during response and recovery to 9/11 attacks in New York City, were able to tap a vast network throughout the United States to obtain and install electrical generators, distribution lines, and cell towers to temporarily restore electric power and communications, and the communication network to do that predated the outage.

Prior to Hurricane Irene's landfall in Brooklyn, New York City, on August 28, 2011, a record pre-event nonmandatory evacuation occurred of close to 2 million people in the New Jersey and New York portions of the New York region alone. The evacuation required timely, accurate, and well-organized communications about the threat's validity, locations of highest vulnerability based on hazard mapping and analysis, and where people could go. The messages were delivered at the highest levels of government with considerable seriousness, with follow-through by emergency response organizations.

In the Indian Ocean tsunami on December 26, 2004, the National Oceanic and Atmospheric Administration recounted stories of how training enabled people to get to safety and how a tribe read the signs of receding waters as a tsunami, thus enabling them to move to higher ground.

the Enhanced Fujita Tornado Scale, and various precipitation, drought, and heat indexes. The U.S. Department of Homeland Security replaced its five-part scale in 2011 with the National Terrorism Advisory System, which provides detailed information on a threat, including whether it is elevated or imminent. Agencies and organizations managing critical infrastructures routinely use aggregated hazard, condition, and performance measures to signal vulnerability and threats. These scales simplify communication; however, the mathematical formulations do not easily map to specific situations, locations, and time periods. Another aspect of how communication is accomplished is communication technology. The very rapid growth of alternative communication methods and the differential transfer to individuals makes this a difficult question to answer. One important lesson is that most communication technologies depend on electric power, which is often disabled in a crisis.

Guidance for the design of crisis communications emerges from a very large literature. It includes, for example, the U.S. Environmental Protection Agency's risk communication "rules" to involve audiences actively in the process, gain trust before communication occurs, respect and be compassionate about audience concerns, and rely on accurate information. Other guidance addresses presentation style, emphasizing the use of graphics, where to place key messages, and the use of trusted messengers.

Conclusion

Crisis communication is an old field of study but will continue to face new challenges as crises change form and intensify and the structure of social networks and who is trusted changes. Fundamentally, effective communication, defined as keeping people safe from harm, depends on trust and individual willingness to adapt behavior to what is being communicated. Communication is an interactive, ongoing process engaging senders and recipients and, though the combination of individuals is usually unique to each situation, modes of communication have emerged that situations share in common.

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See Also: Early Warning Systems; Electronic Media; Emergency Alert Systems; Emergency Public Information; Information Asymmetry; Information Vacuums; Mass Media; News Media; Public Awareness and Education.

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Crisis Information Management Systems

Crisis information management systems (CIMS) are employed within emergency operations centers (EOCs) to better coordinate complex emergency response and recovery efforts. An EOC provides a physical location for the centralized management of emergency operations, including the collection, management, and documentation of information. CIMS were developed to aid in this process. Information technology (IT) was targeted as essential to improved emergency response and recovery coordination. Crisis information management software, also known by the acronym CIMS, is an essential component of many crisis information management systems. CIMS usage provides improved efficiency, faster and more flexible emergency response and recovery times, and more fully informed decision-making capabilities, which in turn can save lives, property, and money.

Crisis information management system has become the most widely accepted term within the emergency management field. Other terms in use have included *disaster management interoperability system*, *coordinated incident management system*, and *critical incident management system*. Emergency response and recovery usually requires multiple agencies at various levels of government and/or between government and the private sector. CIMS provide more effective central command and control operations within EOCs, alleviating problems such as redundancy, confusion, miscommunication or lack of communication, and delays.

Development and Use

The development of CIMS in the United States was part of a larger effort to improve emergency response and recovery efforts under the Department of Homeland Security and the National Incident Management System. These efforts occurred in the wake of systemic problems identified after the 9/11 terrorist attacks in 2001 and Hurricane Katrina in 2005. Critical among these problems was a general lack of overall situational awareness among the many agencies dealing with disasters, pandemics, or terrorist attacks. National government agencies and areas with large populations have been among the first to adopt CIMS.

CIMS are not used only in federal, state, and local government EOCs. Private-sector use spans diverse industries such as telecommunications, utilities, energy, security, health care, agriculture, banking, and education as well as various voluntary and nonprofit agencies. Other countries as well as international nongovernmental organizations (NGOs) have implemented CIMS. The United Nations (UN) has worked with the ICT4Peace Foundation to develop a CIMS as part of its UN Crisis Information Management Strategy. The goal is to better coordinate international humanitarian disaster and conflict response and relief efforts in response to problems identified through the 2010 Haiti earthquake, among other disasters.

Although there are no standard requirements for CIMS, many CIMS share common components. Operational methodology management identifies and defines the core concepts underlying the EOC's mission, while the incident management or command system outlines the command-and-control structure as well as relations among the various agencies and government levels involved in emergency operations. Situational awareness utilizes the information gathered through CIMS to allow EOC personnel to be fully informed of the current crisis as it unfolds in real time. CIMS may also encompass daily EOC management and planning and preparedness activities.

Personnel management covers defining individual, team, and organizational roles and duties as well as mission and source tasking. Notification management covers incoming and outgoing messages such as assistance requests, press releases, and public alerts. Document management ensures that all documents either collected or produced by CIMS are properly stored and easily retrievable, while report management allows for the generation of status and other vital reports. Notification and document management also ensure reliable communication as well as access control such as user authentication and authorization services and data security. Financial management encompasses effective tracking and utilization of assets,

Centers for Disease Control and Prevention (CDC) acting director Richard Besser shows U.S. Secretary of Health and Human Services Kathleen Sebelius logistical assessments relating to swine flu outbreaks posted inside the CDC's emergency operations center on May 5, 2009, in Atlanta, Georgia. The CDC uses WebEOC, an Internet-based, locally configurable incident and event management tool.

resources, expenditures, budgets, and assessment modeling such as damage assessments. Other management tasks can include shelters, mobile recovery sites, and infrastructure such as roads and bridges.

Software

CIMS software is a critical component of CIMS. These software programs are designed to provide the communications and information technology support critical to the EOC's functioning. CIMS software can perform a variety of functions such as alert network operation and notifications, event evaluation, task assignments and prioritization, resource deployment, briefings, and real-time monitoring. CIMS software can even be designed to function as a virtual EOC. CIMS software may be designed as stand-alone but generally does not operate in isolation. There are both Web-based and non-Web-based CIM software programs.

The local autonomy granted by the U.S. federal government has led to the creation of a variety of CIMS software products and allows various EOCs greater flexibility in deciding which CIMS software to purchase. Companies that offer EOC CIMS software include Alert Technology (makers of Ops Center), Blue292, Emergency Manager (makers of the product of the same name), Emergency Services Integrators or ESi (makers of WebEOC), E-team, Essential Technologies (makers of Incident Master), *Soft*Risk, Ship Analytics (makers of L-3 CRISIS), Public Safety Group (makers of EM/2000), and Strohl Systems (makers of Incident Manager). The U.S. Department of Homeland Security manages its own secure Web-based information-sharing portal known as the Homeland Security Information Network (HSIN).

The various CIMS software products contain many of the same components, such as emergency support functions; command, control, and communication functions; and resource management functions. Specific components often include weather and plume modeling, street mapping, geographic information systems (GIS), and monitoring and data acquisition systems such as aerial and satellite photography, cameras and closed-circuit television, and CBRN sensors. Most CIM software utilizes databases for data storage and sharing capabilities. The most common data transfer method is the Internet Protocol (IP), and the most common data exchange language is eXtensible Markup Language (XML).

The National Incident Management System Supporting Technology Evaluation Program (NIMS STEP), established by the Department of Homeland Security in 2005, evaluates CIM software as part of its duties. Several key studies have also evaluated CIMS software programs across vendors to identify benefits, problems, and user needs. These include the National Institute of Justice's 2001 "Crisis Information Management Software (CIMS) Feature Comparison Report," the Institute for Security Technology Studies' 2004 "Crisis Information Management Software (CIMS) Interoperability: A Status Report," and 2007 and 2008 surveys conducted by the U.S. Air Force and the University of Colorado Center for Homeland Security.

One of the key concerns identified in comparisons of CIMS and CIMS software is the issue of interoperability, or the ability of separate systems and software programs to communicate critical information and exchange services. Interoperability is essential to proper functioning between various EOCs as well as between EOCs and their users. CIMS must also be designed to operate effectively between multiple agencies and responders within the government and private sectors. CIMS must also adapt to the varying levels of infrastructure, information technology knowledge and accessibility, and information technology systems these agencies may possess.

CIMS and CIMS software are flexibly designed to allow for adaptation to location, agency, or type of emergency. CIMS must also account for problems that often arise during emergencies, such as network outages and damage to communications or information technology infrastructure. The most effective CIMS are easy to use and implement in an emergency; work in challenging environments and conditions; do not require extensive training, maintenance, or support; can be customized to suit specific needs; and are interoperable with other CIMS and emergency management systems. CIMS are ultimately reliant on their underlying structures, software, and personnel for success.

Common terminologies, responder roles, and frameworks for information flow have yet to be fully developed or widely adopted, hindering CIMS interoperability and the ability of agencies in varying fields to communicate. Other problems include the unwillingness of agencies to share data, data security and access issues, the use of sector-specific standards, and redundancy across agencies and sectors. Future challenges are to improve interoperability and standardization of use and to overcome resistance or boundaries to CIMS use, including data security, cultural, and financial issues.

The OASIS consortium is one of the leaders in the development of universal CIMS standards through its Emergency Management Technical Committee. The first was their 2005 Common Alerting Protocol (CAP), which provided a common XML format for use in alerting and public warning systems. CAP users in the United States include the Department of Homeland Security and the National Weather Service. Other standards in practice or under development (as of 2012) include the Emergency Data Exchange Language (EDXL), which itself includes the EXDL Distribution Element; the EDXL Resource Messaging; and the EDXL Hospital Availability Exchange Language.

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See Also: Collaboration; Coordination; Crisis Communications; Emergency Management System; Emergency Operations Center; Interoperability.

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Crisis Management, Emerging Trends in

A crisis is a significant issue affecting a firm or its stakeholders that, if left unattended, can lead to severely negative outcomes. Key characteristics of a crisis are that it requires an immediate response, has low probability of occurrence but high impact, and is clouded in ambiguity of cause, effect, and resolution. As the number and frequency of crisis events have grown in recent decades, the sophistication of crisis management responses has also matured. Below are three emerging trends that are worth attention if organizations want to continue to develop their crisis management capability.

Emerging Trend: Bridging the Cultural Divide

In its most comprehensive form, crisis management is marked by five primary activities: signal detection, preparation and prevention, containment and damage control, business recovery, and learning. By and large, however, it is the crisis containment and damage control activities that receive the lion's share of attention by organizations in crisis, by those responsible for managing the crisis, and by victims of a crisis. Damage control is marked by two types of behaviors. The first is crisis containment, where the focus is on immediate problem resolution. The goal of crisis containment is to limit the reputational, financial, and other threats to firm survival. This can be achieved by activities that limit the encroachment of a localized crisis into otherwise unaffected parts of the organization or the environment. In BP's case, there was an urgent need to stop the spread of oil along the shoreline. One of the firm's technical responses was to deploy booms that would contain the oil.

Beyond the technical response to crisis management and containment, however, is the communication response. It is through an effective communication and public relations strategy that a company is able to convey to stakeholders the severity of the crisis, instructions (e.g., in the case of an emergency that might require evacuation procedures), plans for resolving the crisis, and more. It is also through the communication channels that a company can frame the cause and accountability for the crisis, convey remorse, and attempt to connect with victims. Of course, different types of crisis require different types of responses, and there are numerous crisis typologies to guide firms in knowing which type of response is appropriate in any given situation.

Using the example of the BP Gulf oil spill, we see a growing need for companies that operate around the globe to manage crises in a way that is perceived to be culturally sensitive to stakeholders who reside in different regions of the world. In other words, the effectiveness of a crisis management response will be increasingly dependent on the firm's ability to match the crisis response to the cultural values and expectations of the victims, particularly when victims operate in a different cultural context from the firm responsible for the crisis. Using a prominent theory of national culture, there are several cultural variables firms must consider in their crisis management response, including the need to reduce the amount of uncertainty surrounding the crisis and its resolution. Crises, by their very nature, evoke ambiguity. When a firm's response fails to convey information that helps clarify the situation for victims, particularly for victims in a cultural context where uncertainty is not easily tolerated, then the receptivity of the crisis response by those victims will be low. Likewise, how one's culture values time will likely affect stakeholder reactions to crisis management attempts. Crises require an immediate response, yet a complete resolution to a crisis may take months or years. For cultures that value a short-term time orientation, they will likely respond more positively to crisis management attempts geared to short-term crisis resolution, or those actions that will have an immediate positive impact on stakeholders, relative to crisis management strategies that emphasize a long-term approach to crisis resolution. Finally, cultures can be identified according to their value for an individualistic or collectivistic orientation. A value for individualism might suggest that crisis management strategies that meet the needs of specific stakeholders (an individual and his or her family) would be more highly valued than the crisis management strategies that speak more to addressing the concerns of a broader community. Conversely, stakeholders who value a collectivist orientation will respond more favorably to crisis management attempts that seek to redress the group of victims rather than meeting individual needs.

Emerging Trend: Managing Social Media

Beyond the cultural implications of the BP oil spill crisis, the case exemplifies another growing trend in crisis management—the need to manage social media. The emergence of social media has grown out of the capability to provide access to news and information over an extended period of time. It was another oil spill, in 1989, that helped spawn the 24-hour news cycle. With word of an oil tanker (*ExxonValdez*) hitting the Bligh Reef in Alaska and spewing thousands of barrels of oil into Alaskan waters, the American news network CNN, in its infancy at the time, had a story that could be broadcast 24 hours a day, seven days a week. Back then, Exxon executives used what we now refer to as mainstream media as the primary vehicle for communicating with stakeholders. Press conferences and daily debriefing sheets were used to disseminate information locally in Alaska, and newspapers and television news networks provided information about the status of the spill to those outside the local community.

Fast forward almost three decades, though, and we see that in the BP case, social media, including Twitter and Facebook, allowed stakeholders and onlookers an opportunity to vocalize opinions and speculate about the ongoings of the crisis. Oftentimes, this public and fast-spreading speculation paints a negative picture of the focal organization, therefore requiring it to respond equally as fast with information that counters the disparaging picture of the firm. Failure to use social media to preserve the firm's reputation in response to a crisis event can put the firm at a severe disadvantage as others are able to put forth a barrage of information and speculation. Until recently, firms that have a communications department whose responsibility it is to provide the messaging around a crisis have operated through traditional or mainstream media formats, perhaps holding town hall meetings with internal stakeholders (e.g., employees) or using television interviews and newspaper ads or editorials to communicate with external stakeholders. But the time lag between traditional media relative to the instantaneous nature of social media is simply too great. With the technology available today, firms that manage messaging well in a crisis have learned to take advantage of multiple communication channels, including social media.

The growing significance of social media in industry is highlighted in the 2012 Makovsky Wall Street Reputation Study conducted by Echo Research. The researchers interviewed 150 Wall

Case Study: Crisis Management During the 2010 Deepwater Horizon Oil Spill

The summer of 2010 proved to be a troubling year for the oil giant British Petroleum (BP). The Deepwater Horizon offshore oil drilling unit in the Gulf of Mexico exploded, killing nine workers and injuring numerous others. The immediate aftermath of this crisis was significant, but the longer-term consequences were even more severe for BP and for a host of stakeholders affected by the ongoing oil leak into the Gulf waters. The leak lasted for a period of months. Local communities whose livelihoods depended on a symbiotic relationship between the oil and gas industry and the tourism industry were paralyzed as BP and the federal government worked to stop the leak from decimating the supply of seafood and the environment. Tainted seafood meant that the restaurant industry and local fishers and shrimpers would see revenue decline to dangerously low levels. Tainted beaches led to a drop in visitors to the coast just at the peak of the tourist season. As a result, the general economy in the Gulf states was also threatened.

To make matters worse, BP's chief executive officer (CEO) and primary spokesperson at the time, Tony Hayward, communicated publicly in ways that raised the ire of many U.S. citizens. Hayward, a British citizen, became infamous for communication and public relations blunders that suggested he was out of touch with and insensitive toward the needs of the local Gulf community. His unmistakable British accent seemed to exacerbate the frustration that a "foreign" company was seen as responsible for causing such devastation in the United States. Among Hayward's more controversial blunders was a comment in a press conference stating "I'd like my life back." The interpretation by many Americans was that the BP executive came across as arrogant and as being more concerned about himself than he was about the fate of the victims of the crisis. A series of poor word choices coupled with the difficulty Hayward and BP had connecting with American stakeholders seemed to highlight the cultural differences between the British oil company and the local southern Gulf community. As this gap widened, American receptivity to BP's crisis response began to wane, and disdain for the company grew, even after it began to make substantial progress on the technical response to the oil spill.

The case of the BP oil spill highlights several important trends in the realm of crisis management. One of these trends is the need for crisis handlers to develop and display cultural competence. As companies reach beyond their own national community and operate in regions all over the world, they need to prepare for the inevitability of a crisis on foreign soil. In the case of the BP explosion and subsequent oil leak, the British-based company's crisis affected U.S. stakeholders, thereby instigating a need to enact a crisis response consistent with the values and expectations of the American victims. Yet, the perception was that the firm's leader managed the crisis in ways that seemed inconsistent with the cultural values of the local community. As a result, there was considerable backlash by U.S. stakeholders to BP's crisis management attempts.

Street executives responsible for marketing and communications at large and mid-sized publicly traded and private firms and found that although more than half of the executives said that their company's social media efforts have had only neutral impact on managing their reputation, slightly more than 40 percent felt it had a positive impact on their company reputation. As crises represent a major threat to firm reputation, the ability for social media to convey reputation-enhancing information quickly can be a tremendous tool.

Emerging Trend: Striving for Innovation

The penultimate phase in the crisis management process is business recovery. This phase precedes learning and comes after the activities associated with damage control and containment. The goal of the business recovery phase has traditionally been to return the organization to pre-crisis status. Understandably, leaders want to be positioned to continue operations post-crisis and not be encumbered by a lingering aftermath. Yet the presumption that business will be the same post-crisis is a flawed one. Business will never be the same following a crisis. The crisis has caused both internal and external conditions to change in such a way that a recovery to the former status quo is impossible. There will be two options. Option 1 is that the firm will never fully recover from the crisis and toil in an effort to recuperate from the financial and reputational loss. Option 2 is that it will not only recover but will thrive in ways not imagined before the crisis. What determines the path a firm will take is the mind-set of the leader and the team responsible for managing the crisis.

When leaders and crisis managers have a mind-set of resilience, they are more inclined to manage the crisis in such a way that creates opportunities for positive change, including growth and innovation. Alternatively, when leaders have a mind-set of fear and threat in response to crisis, they are more inclined to be paralyzed and constrained in their thinking and decision making. The threat frame inhibits creativity and innovation, whereas the resilience frame ignites it.

Practically, then, the most effective crisis management strategies involve a number of resilience-related activities. For example, crisis managers will identify and treat the root cause of the crisis, not only the surface issues that typically have the most visibility. In the case of the BP oil spill, the focus was on the high visibility concerns such as repairing the equipment to stop the leak and cleaning the shoreline damaged by the oil. Clearly those items needed to have been attended to, but equally important are those crisis management activities that seek to understand the root cause leading up to the rig explosion and oil spill. Clearly the equipment malfunctioned, but identifying possible conditions contributing to the malfunction (e.g., safety culture, resources devoted to maintenance, communication channels between rig workers and management) may spark a learning that can lead to significant procedural changes or innovations that would go undetected in the absence of a root cause analysis.

In addition to a root cause analysis approach to crisis management, taking both a short- *and* long-term orientation can foster post-crisis reliance and innovation. Many of the opportunities from crisis are likely to materialize over a long-term orientation, yet most crisis management activities take a short-term perspective precisely because the immediate needs are so great. By focusing on crisis response needs over the long term, firms may see opportunities for research and development, human resources, and operational units within the firm to contribute to new product development, enhanced services, and alternative policies and procedures that may not have been visible by only focusing on the short-term crisis management responses.

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See Also: Business Continuity Management; Crisis Communications; Electronic Media; Mitroff's Five Stages of Crisis Management; Reputational Risk.

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Crisis Simulations

Simulations are synthetic representations of salient phenomena in the physical world. The development of simulations may include methodological approaches from traditional experimental psychology, ethnographic field methods, and domain-relevant scenarios. The platform for a simulation—that is, its medium of delivery—may range from analog to digital to virtual. Similarly, a given simulation may operate autonomously or with interaction from human agents. Crisis simulations are simulations that are meant to represent crisis situations and are found in operational, training, and planning contexts. While the focus of this article is on simulations for training, operational and planning uses are briefly discussed. This article reviews selected historical developments, the role of simulation in crisis management, and challenges for simulation designers.

Historical Developments

Field studies in human factors and related fields have provided rich and nuanced knowledge about individuals and teams at work in crisis environments. Likewise, controlled laboratory experiments have provided the foundation for countless contributions to understanding of the human characteristics that impact the development and use of systems, devices, and environments. Yet the latter are limited in what they can tell us about work situated in real-world settings, just as the former are limited in their support for precision and replicability. Enter the simulated task. Referred to by various names under the broad umbrella of games and simulations, realistic re-creations of applied work environments offer some of the best of both methodologies. They provide a means to temper the complexity of field research while facilitating controlled manipulation and observation of real-world tasks. Simulations also afford the opportunity to address real-world problems by testing ideas for innovative human-centered tools and techniques, which are brought back into the field for further study. Of course, simulated tasks are not meant to replace either approach to research. Indeed, they are interdisciplinary by nature. Field research is necessary to inform the development of an appropriate and realistic task environment. Likewise, the operation of the stimulus and collection of accurate and meaningful data relies on decades of fundamental laboratory-based research methods.

Role of Simulation in Crisis Management

Although research using simulated tasks may achieve many things where other methods fail, it is by no means a straightforward pursuit. This area is host to a diversity of conflicts, compromises, confounds, and complications, both practical and conceptual. Simulations can be quite costly and complex to develop, though off-the-shelf games have been adapted for both training and research in many crisis applications. The traditions of different disciplines regard games and simulations with varying degrees of credibility. Recruiting and retaining suitable participants can be challenging, especially with regard to naïve test subjects so frequently relied upon in academic research.

Much has been said already about what simulations and games can provide that other research methodologies do not. But the complexity and richness of the results they afford is matched by the complexity and cost of their conception, design, implementation, and validation.

Simulation Platforms

Operation of a simulation requires a platform upon which participants, technology, and, if desired, a training program may be placed. Different simulation platforms allow for different degrees of manipulation of key environmental variables in the crisis domain (e.g., tempo of crisis event, possible consequences, resources available, etc.). The following typology is useful in determining which platforms are best suited to manipulating various variables relevant to the crisis domain.

Drills are cognitive and physical activities that enable personnel to develop skills for use in executing procedures. They may also be used to develop knowledge about how these skills may be combined based on the unique requirements of a particular emergency.

Tabletop exercises use small-scale physical mock-ups of emergency situations, as well as a mix of decision makers, in order to enable a stronger connection between decision makers and the physical world. They are particularly useful for practicing roles and interpersonal interactions. The goal is to discuss problems in depth and develop decisions through slow-paced problem solving.

Functional exercises are real-time exercises that are based on dynamic models of the event. These exercises allow for near-continuous information about the event and the consequences of decisions to be conveyed to participants. The focus is on the practice of a specific function or a complex activity within a functional area. The consequences of the decisions to the emergency situation and the interactions with other functions and outside personnel are simulated. It should be emphasized, however, that the simulator may be a computer or, in the case of so-called Wizard of Oz exercises, a human controller. These exercises are more capable than the previous ones of inducing stress, because they are generally based on a rich (and therefore more life-like) interaction.

Full-scale exercises are meant to replicate, as closely as possible without jeopardizing safety, an actual emergency. This type of exercise is a scenario-based extension of a functional exercise to all the functions, and complex activities of an actual emergency are conducted under high levels of stress and real-time constraints with minimal simulation. Participants use actual facilities and resources, have access to realistic information, and are expected to behave as if the events were real.

The simulation platform may be installed in a variety of settings, ranging from realistic to futuristic. A mock-up version of an emergency operations center (EOC) often has key differences from an actual EOC, such as the presence of video and audio recording devices for capturing conversations and physical movements among participants, as well as tools for logging participants' interactions with the human–computer interface installed on their laptops. A high-tech EOC would utilize the range of current technologies to support sensing, communicating, and decision making. All three share some common essential features, such as clear lines of sight to larger-scale displays (e.g., digital and analog maps), capabilities for individual interaction with computer interfaces, a layout that facilitates direct person-to-person interaction, and technologies for communicating with EOC support staff.

Interaction and Instrumentation

Interaction and visualization tools allow interaction by individuals or groups with simulation. For example, they may enable graphical and voice-based communication between participating personnel and their staff, as well as tools for logging these interactions. In the context of planning, simulation systems such as HAZUS may be used to calculate reliable damage and loss scenarios during the initial response period when no field data are available. Systems for first responders and incident managers may be based on virtual reality technologies. The costs of incorporating these systems into interactive simulation-based training varies in part with the number of simultaneous users. The larger the group, the more technologically challenging and expensive the systems are. Distributed simulation systems are typically used for collaborative training.

Instrumentation enables integration and analysis of three distinct but related data streams, corresponding to (1) the internal state of the simulation, (2) interactions among participants (e.g., conversations, gestures, and focus of visual attention), and (3) interaction between participants and the simulation. Simulation state may be effectively captured by building logging capability into the simulation itself. For example, a complete record of system state may be made at each 5-second interval via transmission control protocol/internet protocol (TCP/IP) to a separate database.

Participants' conversations and gestures may be captured via digital audio/video taping, then time-coded to facilitate post-training analysis. Given the importance of visual search in supporting situation awareness, eye-tracking or related hardware and software may be used, perhaps in conjunction with tools for unobtrusive recording of participants' movements. Finally, interaction between participants and the simulation can be captured by logging keystrokes and mouse movements of participants.

Challenges for Simulation Design

Training requires a training environment, as implemented on some platform, within which trainees can communicate and make decisions with respect to the emergency situation. The use of training platforms allows for the manipulation of a number of design variables relevant to improvisation, including risk, dynamism, stress, information structure, and feedback. Many available training platforms lack the capability to handle the dynamics that arise during emergency response operations. For example, HAZUS is used in the United States mainly for disaster planning at the local, state, and federal levels. Because of the limited possibility to include dynamic information and because it is a stand-alone tool, this system can mainly be used in a static way during emergency response training. There is an increased use of information technology–intensive training systems for tabletop, functional, and full-scale exercises.

A number of opportunities for further development of information technologies may be identified from this discussion.

Generation of more realistic scenarios: Specialized simulation systems may be used for scenario generation.

Interactive simulation-based training: Simulation systems (typically real-time simulations) vary from use for individuals to larger groups. The larger the group, the more technologically challenging and expensive the systems are. Distributed simulation systems are typically used for training of groups. Systems for first responders and incident managers may also use virtual reality technologies.

Training evaluation: This set includes tools for logging and analyzing the decision process, such as video and audio recording of individuals or groups, keyboard logger, event logger for software packages, and tools for automatic report generation.

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See Also: Decision Making; Simulations; Training.

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Critical Applications

As businesses move closer and closer to having all of their tools available through computing, many risk and business continuity managers are today focusing their efforts on ensuring that systems, or applications, are always available to ensure that productivity continues and that business operations do not stop. But through this increased emphasis on making applications available, or quickly recoverable during a time of crisis, a more thorough process has been designed to take into consideration which applications must recover the quickest, which ones can take a lower priority, and how much it costs to ensure that the proper technology is in place in order to accomplish these goals. Through these discussions, a stack ranking, or what is more commonly referred to as "criticality," has been designed in order to balance the goals of ensuring that applications continue to operate while keeping within an organization's allocated budget constraints. Most common classifications today for applications range from the lowest priority, sometimes called "Deferrable," to "Import," to "Critical" or what some term "Mission Critical." All of these classifications have different meanings, recovery thresholds, and, of course, costs to maintain the level of assurance to the business.

Determining and Classifying as Critical

There are many aspects to determine what applications can, and will be, classified as critical to a business or government operation. Some operations design their own system of making these determinations, considering factors such as the industry of the operation, how large the business is, available budget and resources, and general leadership buy-in on the design and expense. But from an industry-generic standpoint, determining an application as critical lies mainly on a few factors based on questions: If the application was not available to your business for more than 24 hours, would you then experience a large financial impact? Would your reputation from a customer standpoint suffer, and would that application have any dependencies with other applications with which it interacts? If you answer yes to these questions, you more than likely have a critical application on your hands, and you will need to incorporate a strategy into your operation to ensure that you protect that application, as well as its data, to ensure that you can recover it very quickly during a time of crisis. Of course, many more detailed questions will have to be asked once you have made the initial determination that an application is critical.

Assessing Critical Applications Objectives

Anyone even peripherally connected to information technology recognizes that the number of business-critical-level applications has dramatically increased in the last few years. However, the levels of availability required for each application vary dramatically. Assessing each application's availability requirements allows storage and networking administrators to target appropriate solutions.

Although assessment of application criticality may be relatively simple for some businesses and government operations, in most cases the process can be complex and time-consuming. This is especially true of applications that have evolved over a period of time with nonuniform development processes. Dependency among applications contributes significantly to this complexity. For example, if Application A relies on a feed from a database controlled by a separate Application B to provide mission-critical information, having complete redundancy for A will be of no use if B is not available. Some of the steps to be taken in the assessment process include listing all your applications, identifying dependencies between applications, creating application groups based on dependencies, prioritizing application groups based on importance, and associating availability metrics for application groups and applications within groups.

Two key metrics that identify the level of availability required for applications and data, especially in a disaster recovery scenario, are recovery time objective (RTO) and recovery point objective (RPO). Recovery time objective measures the acceptable time for recovery. RTO poses the question, How long can the application be down? Cost and downtime implications determine RTO for a given application. There have been several studies on the cost of downtime for specific market segment applications in retail, telecommunications, manufacturing, e-commerce, energy, and financial services. These studies often take into account not just the short-term tangible loss in revenue but also the intangible long-term effects. Although these studies provide useful data, organizations can greatly benefit by performing a thorough assessment customized to their environment.

RTO for an application, in turn, helps determine the tools and technologies required to deploy the appropriate availability level. For example, if the RTO for a given application is seven days, then restoring from backup tapes may be adequate. On the other hand, if the RTO is a few minutes, wide-area replication and failover may be required in case of a disaster.

Recovery point objective measures the earliest point in time to which the application and data can be recovered. Simply put, it seeks to determine how much data can be lost. The nature of the particular application typically determines the RPO. In case of a major data center outage, it may be acceptable for certain applications to lose up to one week's worth of data. This could be from a human resources application, in which data can be re-entered from other document sources.

Once again, as in the case of RTO, RPO helps determine the tools and technologies for specific application availability requirements. If, for example, the RPO for a human resources application is indeed determined to be seven days, then restoring from backup tapes may be adequate. However, for a banking application that deals with electronic funds transfer, the RPO is likely to be seconds—if that. In this case, in the event of a data center outage, nothing short of synchronous data replication may suffice.

Overall, when assessing your objectives, ensure that you are asking the right questions that pertain to your operations in particular, and then design a methodology around your functions.

Critical Applications Methodology

For a lot of business and government operations, once the initial determination of an application being critical to ongoing operations has been made, many ask themselves what they need to do in order to ensure that this application is highly available, and, of course, quickly recoverable after a crisis. Many operations are often found floundering in the deep waters of information technology (IT) expense, consultant assessments, competing priorities, and the sheer myriad tools available to help them protect their investment. One thing is for sure: As we continue to immerse ourselves in technology, there will be more available tools and assistance to help you wade through all of the different aspects, so don't expect things to get any clearer from the standpoint of options from which you should choose. From a simplistic standpoint, though, to incorporate a critical applications methodology into your operation, you must consider designing a process for this around your operation that will meet your goals of protection, keep your costs to a reasonable amount, and bring a level of resiliency to your business continuity in order to make a good return on investment (ROI) statement to your leaders. Some operations simply back up their data more often, or in a different manner, so they can recover quicker; some design more sophisticated solutions such as having the critical application set up at a disaster recovery data center site, and/or bring in a virtual, or cloud-based, application that lives at a separate location owned by a data center company (commonly referred to as a colocation site) that ensures available uptime for your application. Either way, having some form of a methodology in place to ensure that your business or government operation is more resilient is a progressive policy.

Proper Recovery Testing

As plans are designed and documented to implement critical applications to a business or government operation, a robust testing process must be designed and exercised to ensure that your solution actually will meet your recovery goals. Many businesses today test designated critical applications on an annual basis, and some test the resiliency, or strength, of their plans more often than that, depending on the impact to their operations.

Incorporating your critical applications testing into your disaster recovery plans is essential for their survival; without a strong partnership between the organization's business continuity management (BCM) and information technology (IT) disaster recovery teams, the chances of having a successful testing strategy, and therefore a successful test itself, are severely compromised.

Some organizations create testing of critical applications with relation to the most common incidents that cause crisis situations, but other organizations rely more on a more generic fact of "system down" scenarios. Either focus point is effective in designing a proper test plan, but the most important component of any recovery plan is the specific procedures needed to restore the critical applications.

The development of a testing strategy requires key business decisions to be made regarding the level of frequency of testing needed to ensure that recovery objectives can be achieved during a disaster. The complexity and frequency of testing are based on the risk to the business or government operation. Even small institutions should participate in tests with other critical components of the business (such as operations processes). Keep in mind that unmanned recovery testing, where backup tapes are sent to the recovery site to be run by service provider employees, is not a sufficient test of an institution's plans.

Testing strategies should exhibit the conditions and frequency for testing critical applications. The strategy should include what objectives you are seeking and schedules, as well as a function for reporting on the results to leadership. Proper evaluation of risks to the business is essential, taking into considerations such as whether you will need full or partial operational capability during a crisis, will you have the workforce to support the critical application, and will you have a reduced demand for your services during a crisis. Mainly, validation of your assumptions to ensure they are appropriate for your requirements is also a key indicator that you have developed a strong test plan to support your critical applications.

Adding Business Value

Today, critical applications and the data that support them are the heartbeat of continued operations, for they make your operation unique; therefore, protecting the critical operations that drive these data is vital to your survival. More important, ensuring that your data are available goes beyond responsive actions to unplanned failures. It encompasses a proactive approach that leads to competitive advantage, which automatically brings more value to your operation. This advantage is built when your customers not only are loyal but also become promoters of your organization because they know they can depend on you, and having a resilient plan for critical applications is a key ingredient in gaining this support

In today's highly competitive business environment, business interruptions resulting from system outages can be devastating. Regardless of the cause—hurricane, fire, accident, computer virus, or even user error—downtime can be not only costly but also in some cases catastrophic. With a mobile workforce, global customers wanting to do business around the clock, and continually greater dependence on technology, you need to not only protect your critical applications but also continue business operations virtually uninterrupted. The cost of downtime, depending on the industry, can range from thousands to millions of dollars per hour—due not only to disaster recovery expenses but also to lost sales, customer defection, financial penalties from violation of legal requirements, and lack of productivity. Add to that a damaged reputation in the marketplace and diminished shareholder confidence, and the cost of downtime can be staggering. Knowing how to properly identify and then manage your critical applications during times of crisis can be the defining factor between incurring multiple forms of damage to a business versus a quick recovery and a solid reputation that your customers and users can count on.

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See Also: Backup Facility; Backup Media; Backup Strategy; Business Continuity Management; Business Continuity Planning; Business Continuity Planning Life Cycle; Business Resumption Planning; Classification of Systems; Contingency Planning; Critical Business Functions; Data Recovery; Disaster Recovery; Exercises; Failover; Impact Analysis; Incidents Versus Crises; Operational Plans; Recovery Time Objective; Risk Analysis; Scenario Planning; Sustainability; Vital Records.

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Critical Business Functions

When a problem affecting critical business functions cannot be handled by normal problem-management processes, the problem escalates to a crisis. The crisis-management process helps control the response to events that impact critical business functions. To successfully manage a crisis involving critical business functions, those business functions must be identified and prioritized, and methods of handling the possible impacts should be planned. Once a set of possible responses is planned, the handling of the crisis should become easier and result in the quick resumption of those critical business processes. In addition, the process of identifying and prioritizing the critical business processes may also find ways to prevent impacts to those processes to avoid a crisis.

Business Continuity Life Cycle

The business continuity life cycle is a good way to plan for events impacting critical business functions. The business continuity life cycle will identify business functions and determine their priority within the organization. The business continuity life cycle will also attach the impact of interrupting each business function in the form of lost revenue and additional costs. Typically, the business functions that provide the most revenue or would result in the most cost are considered critical business functions. The business continuity life cycle process lets decision makers finalize the priority of critical business functions in what is commonly referred to as the business impact analysis.

Hazard Vulnerability Assessment

Along with the business continuity life cycle, there is the hazard vulnerability assessment, which attempts to list the possible threats to a critical business function and gauge the vulnerability to those threats. The hazard vulnerability assessment ranks the threats according to how vulnerable an organization is to those threats, yielding a prioritized list of threats. That list is matched to the prioritized list of business functions in the business impact analysis, and where the high-vulnerability threats would impact the high-priority business functions, plans are made to prevent and mitigate the impact. Critical business functions very often make use of technology and have a significant number of people involved. Some critical business functions also require specialized skills from the people who perform those functions.

Business Continuity Plan

Once the critical business functions have been prioritized, two planning processes should be conducted that will produce written plans. The first is the business continuity planning process, and the second is the disaster recovery planning process. The business continuity plan prepares procedures that will enable critical business functions to be performed in the absence of the usual technology. Business continuity plans often involve performing the critical business function using manual processes. It is very good when manual processes can be used because it may be a while before technology can be reacquired. Another method that can be incorporated into the business continuity plan is to use the more available technology that has not been impacted, such as applications on personal computers. Sometimes temporary processes using a PC and its applications can successfully perform critical business processes, and then later, the information stored on the PC can be sent to the recovered information technology environment. In this way, when a crisis develops, the business continuity plan will allow the critical business function to operate until the technology can be recovered by the disaster recovery plan.

Disaster Recovery Plan

The disaster recovery plan prepares procedures to recover the technology normally used for the critical business functions. There are many ways to recover technology, but any recovery method must be compatible with the possible outcomes of the threats and vulnerabilities. For example, it may not be a good idea to plan to recover the technology in the same building that was just destroyed. Instead, a disaster recovery site can be obtained to hold the recovered technology until the destroyed building can be salvaged. Because there are costs associated with a disaster recovery site, the planning should specify what type of site would work best. There are hot sites, where preconfigured equipment is running and waiting to take over as the primary data processing site. There are cold sites that consist of just raised floor space and climate control where replacement equipment can be shipped, then configured, and then used. There are also warm sites, where there is some raised floor for replacement equipment and also some hot site characteristics in that some equipment is there, running, but not enough to recover everything—just enough for the most critical applications. In addition to the site where the recovery will take place, there is also need for backup media on which the vital information will be stored. There are many considerations for backup media that will affect how a recovery is performed. There are many options, and an organization new to disaster recovery planning should enlist the assistance of a trained disaster recovery planner.

Succession Plans

Another important planning item is to have a line of succession for key people and alternate places to get the skilled workers necessary to perform the critical business function. Key people should have at least three alternative members of the organization who can make the same decisions in case the key person is not available. Skills can usually be obtained from temporary help organizations that have the people whose special skills are required.

Insurance

Planning ways to prevent and mitigate the impacts to critical business functions is not without some cost. The business continuity plan and the disaster recovery plan identify equipment and services that will help execute the business continuity plan and the disaster recovery plan. To help with the financial side of things, there are several types of insurance an organization can obtain. Some of those insurance instruments are called business interruption insurance, lost revenue insurance, and key person insurance. Each assists with the financial side of the problems they name. Of course, to make a claim for any insurance, a detailed list of equipment and skilled people needs to be maintained because the first thing a claims adjuster will ask for is proof that the insured items are lost.

Invoking the Plans

The activities in the business continuity plan and the disaster recovery plan and the process for making claims for insurance all become part of, and are controlled by, the crisis management process. Immediately after the event invokes the crisis management process and the assessment of the crisis says critical business function will be halted for a predetermined period of time, the commands are given to begin any business continuity processes. When it is evident that the technology will not become available for a predetermined period of time, the disaster recovery plan should be invoked and a disaster declared by the organization. As the impacts and damages are documented, the commands are given to initiate claims processes with the insurer to provide funds for the recovery.

Incident Command System

Crisis management can be a very chaotic process. It is best to have a specific way to conduct the crisis management process. One proven method is the Incident Command System (ICS), is a standardized, on-scene, all-hazards incident management approach that has been developed and proven successful over many years of crisis management. It is a very organized approach to handling a crisis involving many organizations and many people. The ICS can be scaled to any event, large or small, as well as any type of participant. Training on the ICS is also free from the Federal Emergency Management Agency's Web site.

Conclusion

Prior to a crisis that impacts critical business processes, the business continuity life cycle should be used to plan for the prevention and mitigation of impacts to the critical business functions. These plans will be invoked by the crisis management process as needed at predetermined intervals based on information obtained about the event and its impacts. The plans consist of the business continuity plan, the disaster recovery plan, and the various insurance coverage. When the normal problem management processes fail to handle a problem affecting critical business functions, the crisis management process is invoked to control activities and expedite the recovery of the critical business processes. With proper control of the activities in the crisis management process, an organization can respond to a crisis and limit the impact to its critical business functions.

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See Also: Backup Media; Backup Strategy; Business Continuity Planning Life Cycle; Data Recovery; Dedicated Site.

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Critical Infrastructure

Infrastructure comprises the facilities and equipment needed for the operation of society or an enterprise. It has both physical and organizational aspects, and hence the term covers facilities (such as buildings, roads, and bridges), sites, systems, and networks, including electronic communications. The term *critical infrastructure* refers to those elements that are absolutely necessary to support the basic functioning of society and the essential services upon which it depends. The loss or inefficiency of these assets would lead to severe economic and social consequences, and in the worst cases there could be loss of life.

In any classification of critical infrastructure, the main sectors are water, energy, food, health, transportation, communications, finance, government, and emergency services. These, in turn, can be subdivided as follows:

- *Water:* dams, treatment plants, pipelines, sewers
- *Energy:* power stations, transmission lines, transformer and switching stations
- *Food:* warehouses, distribution networks, sales points
- *Health:* hospitals, emergency systems, pharmaceuticals
- *Transportation:* road, rail, air, water (including airports, sea ports, highways, railway lines, and bridges)
- *Communications:* land-line and mobile telephone systems, cyberspace
- *Finance:* banks, money supply, financial services
- *Government:* national, regional, local
- *Emergency services:* fire, police, ambulance, specialized response

The critical nature of infrastructure can also be viewed in terms of geographical scale, and in this context it can be classified as national (of importance to the functioning of national life) and local (of importance to the functioning of local affairs).

Essentially, three kinds of hazards threaten critical infrastructure: extreme natural phenomena include floods, storms, earthquakes, and volcanic eruptions, distributed according to the prevailing geography and temporal pattern of such events; technological failures, which are complemented by the damaging effects of human error; and intentional events, such as those associated with terrorism and sabotage. The elements of critical infrastructure may be vulnerable and exposed to these hazards either singly or in combination. Vulnerability refers to the propensity for harm, while exposure can mean either that the assets are under threat for given periods of time or that they are at risk of possible loss to a given extent.

Measuring the Risks

Damage to critical infrastructure during an extreme event may cause both direct and indirect effects. The former comprise interruption of service, destruction of assets, and losses of capability that arise directly from the phenomenon that causes the harm. The latter result from "knock-on," or cascading, effects, for example, pollution of the environment following natural hazard damage to an industrial plant.

In the case of critical infrastructure, although there is a prima facie case for risk aversion, this is usually too expensive to contemplate, with the exception of high-reliability systems, such as civil aviation, for which exceptional measures are both warranted and supported by public intolerance of the risks. Instead, for most forms of critical infrastructure, risk is managed using the "as low as reasonably possible" (ALARP) concept.

This poses two arbitrary thresholds: one of them defines unacceptable risk, and the other pertains to broadly acceptable risk. Risks that fall above the former threshold must be reduced,

U.S. Small Business Administration Administrator Karen Mills (left, front) and other federal and city officials survey storm damage in Alabama from the April 27, 2011, tornado, which killed 72 people in four states. Tuscaloosa Mayor Walt Maddox said the area's infrastructure was decimated by the tornado. Among the infrastructure losses were a fire station, the police department's east precinct, a communication tower, and a facility that contained the Emergency Management Agency and Environmental Services Departments.

either because the consequences of failure are unacceptably high or because there is strong and fairly unanimous support for investment in risk-reduction measures. The second threshold is defined by consequences that are not sufficient to render the infrastructure inoperative in any but the most improbable circumstances. Between the two thresholds is an area in which it is opportune to reduce the risks to the lowest possible level, conversant with reasonable expenditures and available—and acceptable—methods. In this process, it may be necessary to demonstrate openly that ALARP has been applied, which can usually be achieved by showing that the methods are appropriate, reasonable, sustainable, and justifiable in terms of costs, efficacy, and predicted reductions in losses. A useful acronym for this process is SMART: Specific, Measurable, Attractive (or acceptable), Realistic (or realizable), and adequate in terms of Timing.

Whether or not infrastructure is critical can be judged by establishing a threshold. This involves assessing the threat to assets (either singly or in groups or clusters) in terms of how their total or partial loss will affect normal life, economic activities, and the provision of essential services. For example, the United Kingdom (UK) uses five levels of criticality, ranging from cases in which losses would be negligible to those in which the destruction of particular infrastructure would have a catastrophic impact on the nation. The UK also has a basic crisis management law (the Civil Contingencies Act of 2004) that designates the operators of critical infrastructure as "second category emergency responders," with a statutory responsibility to prepare for emergencies.

By way of example, very many ordinary transactions are dependent on the availability of banking services, without which salaries cannot be paid and goods and services cannot be procured. In a similar vein, the loss of electrical current would cause grave problems for medical procedures, transportation, commerce, and a host of other activities. In both cases, the problems would tend to become dramatically worse the longer the service interruption lasts. Hence, planning and protection are essential to the maintenance or quick restoration of vital services. For particular structures, services, or groups of assets, a criticality threshold can be established by ascertaining whether their loss would pose serious problems for the conduct of normal daily life. Above a certain level of loss, the infrastructure affected can be classified as critical and of national or local importance. The problem is also a dynamic one. In some cases, short outages may have only nuisance value, but longer interruptions may be very serious. For example, volcanic ash in the atmosphere may curtail civil aviation, as happened for almost one week in Europe in April 2010 with the eruption of the Icelandic volcano Eyjafjallajökull. Airlines and businesses that depended on airlines suffered losses, but a longer period of inactivity would have led to a rash of bankruptcies among strategically important industries, not least the airlines themselves.

To prioritize interventions for the protection of critical infrastructure, a risk matrix can be used. This classifies the level of harm that is likely to occur to an asset or group of assets and compares that with the probability of an adverse event. High probability of a crisis and great sensitivity to losses add up to a strong priority for intervention

Case Study: Earthquake Threats to Water Supply Infrastructure

Water supply systems and networks are part of a nation's critical infrastructure. In seismic zones, the first task is to assess the nature and magnitude of the threat to the system.

Seismic microzonation can be used to subdivide geographical areas occupied by the infrastructure according to the pattern of hazards. This usually involves analyzing the historical record of seismicity, including return periods and local magnitude-frequency relationships. It also requires geologists and seismologists to scrutinize the local stress field in the Earth's crust and make projections of the slip rate of local faults. Microzonation maps can show the potential for ground shaking, sedimentary and topographic amplification of seismic waves, liquefaction susceptibility, lateral spreading, landslides, rockfall hazards, and earthquake-related flooding. Moreover, the assessment of seismic risk to dams and reservoirs can help define potential failure inundation (that is, floodable) areas.

Maps of peak ground acceleration (PGA) or peak ground displacement (PGD) can depict the potential for damage to buried lifelines. If liquefaction (the spontaneous transformation of ground from the solid to liquid state under earthquake loading) is possible, a liquefaction potential map can be drawn up. The interaction of the water distribution infrastructure with the performance of different terrains can be analyzed in relation to a map of seismic amplification. An earthquake response spectrum can be calculated in order to represent peak acceleration, velocity, or displacement response of a structure or system with a particular natural vibration period and a fixed damping ratio (damping refers to the forces that resist vibration). These calculations and mapping exercises are conducted in relation to a design event, which is usually conceived of as the maximum credible earthquake (MCE).

A geographic information system (GIS) should be used to compare the seismic data described above with the pattern of water supply lines. After an earthquake, damage data can be added as a map overlay. Appropriate mapping scales are 1:50,000-1:100,000 for subregional networks, 1:5,000-1:10,000 for local networks, and 1:1,000 for a specific plant, such as a water treatment facility.

to reduce the risk. Once again, the matrix may need to be viewed in terms of a dynamic reality, in which risks vary over time, are possibly cumulative, or increase nonlinearly as a result of a protracted crisis.

Protecting Critical Infrastructure

The process of critical infrastructure protection may involve programs, plans, activities, or, better still, all three. Once an asset or group of assets has been identified as of critical importance, the first action should be to assess its weaknesses. This may involve creating scenarios of what is likely to happen in a crisis and how the infrastructure is likely to perform under duress. The second stage is to create resilience and redundancy. This may involve "hardening"—that is, making the assets more robust, so their performance does not deteriorate significantly under stress. At the same time, protection measures can be created, including structural measures, such as building techniques designed to resist impacts, and nonstructural approaches that rely on procedures and plans to counter the effects of an emergency. Design that is tolerant of faults can be used, and so can "fail-safe" design, in which measures are taken to ensure that the effects of damage or destruction are relatively innocuous.

Resilience may involve maintaining adequate levels of operating supplies and ensuring that reserves of manpower are sufficient. Contingency and emergency plans must be drawn up and kept current. They must also actively involve top management. The plans should include procedures for restoring essential services in the event of any interruption. In most cases, they will be based upon credible scenarios for failures and disasters. Finally, most critical infrastructure protection involves redundant systems. For example, hospitals depend so heavily on continuity of electrical supplies that they usually have diesel generators that will start up on the instant that power supplies are interrupted. This limits the danger of, for example, spontaneous interruption of surgical operations that require lighting and power to life-support systems. Nevertheless, the autonomy of generators is limited by available diesel fuel reserves and supplies.

Before design standards can be adopted in order to protect critical infrastructure, interdependencies must be measured and protection strategies must be evaluated. If safety-critical objectives need to be adopted (and they are a mark of the criticality of infrastructure), then design should ensure performance levels that are capable of withstanding the greatest shocks to the system that can be envisaged. With respect to "normal" (that is, noncritical) infrastructure, this may appear to be overdesign, but in the event of a highly abnormal crisis, it will be well justified.

Like other assets at risk, critical infrastructure may be subject to cost-benefit evaluation of any investment in protecting it. Crude logic suggests that investment in protection measures should cease once equality is achieved between cost and benefit. However, the hidden costs of not protecting critical infrastructure may change the picture. Hence, there is a greater propensity to invest in apparently disproportionate measures, because the infrastructure is strategically important and because its loss or inactivity would lead to exceptionally serious or unduly expensive consequences.

Most governments would recognize the value of putting into practice a comprehensive program of critical infrastructure protection. This would involve looking systematically at the list of essential physical, socioeconomic, and information technology assets and creating a strategy to invest in their protection on a prioritized basis. This should be an ongoing process, as development and growth constantly change roles, relations, and the value of the assets.

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See Also: Bridges; Buildings; Critical Business Functions; Damage Assessment; Downtime; Hazard Vulnerability Analysis; High Reliability Organization Theory; Sabotage; Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis; Threat Detection.

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Criticality Assessment

Although criticality assessments may be conducted for a variety of potential hazards, the events of September 11, 2001, have seemingly permanently linked the term to thoughts of terrorism. In an attempt to demystify the process, consider that we all perform criticality assessments in life, and typically do so at an early age. In fact, we often perform criticality assessments without even considering what we are doing. Imagine sitting in front of a chessboard across from a very capable opponent. You have the move, and in preparation you consider where are you vulnerable, where the opponent is vulnerable, and what are the consequences of a variety of moves available to you. As you consider these things, you are in part performing a criticality assessment of your own pieces, and also of your opponent's.

A more formal criticality assessment requires more consideration than a chess game and uses methodologies and tools to help make determinations about where and how to deploy available resources and assets. Criticality assessment is different from risk and vulnerability assessments but incorporates them into the matrix of consideration. Criticality assumes limited resources, meaning that there are not enough to harden every perceivable potential loss. At the very base of purpose, criticality assessment is a process that serves as a tool for helping identify those assets most critical to continuity of operations/existence. When we identify the assets most critical to us, we can more wisely apply available resources to protect them.

Before engaging in criticality assessment, it is important to understand that it is a tool in many varieties; there us a plethora of methodologies and matrices to assist in the process. The fact is that two people performing criticality assessments in the same organization may arrive at different outcomes; there is some subjectivity in assessing what constitutes the greatest criticality. The process of assessment requires some level of predictability, which will also contribute to different outcomes. Determining success in criticality assessment is extremely difficult; proving the fact that an event did not occur as the result of proper critical assessment is seemingly impossible.

Criticality Assessment as a Process

In 2003, President George W. Bush issued Homeland Security Presidential Directive 7 (HSPD-7)—Critical Infrastructure Identification, Prioritization, and Protection. The directive title identifies the basic structure of the process of performing a criticality assessment: identification of critical infrastructure, prioritizing the importance of each element, and implementing appropriate protective measures. The process is essentially the same for any dimensions of assessment; the same three basic steps are followed in reviewing a facility or network of facilities, a small community or a large metropolitan area, an individual state, or a nation of them.

Step 1—Infrastructure identification: The 2003 Bush directive essentially expands on President Bill Clinton's 1998 Presidential Decision Directive—63 (PDD-63)—Protecting America's Critical

Infrastructures. The 2003 directive expanded the listing of infrastructure sectors from those listed in 1998. Other presidential papers have identified different listings from these two; in fact, today there are multiple lists of critical infrastructures. This points directly to one aspect of the difficulty of performing a criticality assessment: determining what constitutes a critical infrastructure.

In their 2003 report for *Congress, Critical Infrastructures: What Makes an Infrastructure Critical?* John Moteff, Claudia Copeland, and John Fischer identified four paradigms of consideration that seemingly explain the multiple lists: national defense, economic security, public health and safety, and national morale. Combining the list for each of the four paradigms produces a list of 20 sectors: telecommunications information networks; energy; banking/finance; transportation; water; emergency services; government; health services; national defense; foreign intelligence; law enforcement; foreign affairs; nuclear facilities, in addition to power plants; special events; food and agriculture; manufacturing; chemical; defense industry; postal and shipping; and national monuments and icons. This listing can be adapted to give meaning and structure to the identification of assets for any criticality assessment.

Once the list is adapted to fit the assessment being performed, the structures can be identified and assigned to the appropriate sectors. The creation of a list based on sectors helps the identification process by prompting ideas about what

Case Study: Critical and Noncritical Infrastructures

Following the issue of President George W. Bush's Homeland Security Presidential Directive 7 (HSPD-7)—Critical Infrastructure Identification, Prioritization, and Protection—federal agencies assigned employees to perform criticality assessments of infrastructures relating to each agency's function. One of these was the U.S. Army Corps of Engineers, and an individual was assigned to identify critical infrastructures in a rural southern state.

Eager to complete the tasks, the individual simply chose to view everything owned or operated by the corps as critical. The state police agency received a very complex and long listing of requests for troopers to be assigned to critical assets. Although the state police agency stood ready to protect critical infrastructure, the listing required more personnel than there were troopers. A command staff officer contacted the corps' representative and explained that the agency had to continue its primary enforcement mission, that there were fewer personnel than had been requested to cover corps resources, and that other agencies were also requesting assistance. The corps representative contacted the governor's office and requested "immediate assignment of all available troopers" and suggested that consideration be given to augmenting them with activated soldiers of the U.S. Army National Guard.

The governor's office contacted the senior-level corps official in the state, and a meeting was arranged to discuss the matter. During the meeting, it was determined that in the original assessment every asset was regarded as critical; a 50-space wilderness campsite was included, as were all boat launches on the corps' lakes and navigable rivers. A more reasonable assessment found two corps reservoirs that were prioritized as critical. One reservoir was the cooling and water source for two nuclear reactors used in the production of electricity; the other had significant housing and other critical infrastructure in the potential flood zone if the dam were compromised.

Other infrastructure components were prioritized as essential, including all locks and dams. During the reevaluation process, it was determined that many of the campgrounds prioritized as critical were on a corps closure list that had been previously developed as a budget-cutting measure. Apparently no regard had been given to available data during the original assessment.

This case study makes plain the need for a structured and reasonable approach to criticality assessment.

assets are essential to continuity of operations. Not all assets will fit into the identified sectors, but not all assets are critical.

Step 2—Prioritization: The concept of prioritization helps identify assets that are most critical to the continuity of operations. This facilitates a determination of which assets to address first, based on their high criticality. Prioritization also allows logical determinations about where to utilize available resources; again, the most critical assets would be selected first. There are a variety of available models to use in determining prioritization, some being quite complex and others very simple. Prioritization is that part of criticality assessment that most nearly represents a quantitative methodology.

A simple model uses three levels of prioritization: critical, essential, and nonessential. An infrastructure or asset is critical if it is vital to continuity of operations or essential to the life safety of individuals. Those things classified as essential are important but would only present a difficulty if unavailable. Nonessential things are those that would pose an inconvenience.

A more complex model includes consideration about the cost of replacement, downtime until a replacement can be installed and operational, and availability of outsourcing. Some of the more complex models include a threat assessment, whereby a determination is made about how likely the asset is to be destroyed by natural disasters or human-made events.

Taken to an individual family level as an example, consider that those things critical to life safety are food, water, some medications, and shelter. Those things that are essential include clothing and sanitation. Most other things fall into the nonessential classification; having electricity is nice, but as many people in the world do, we can survive without this relatively recent innovation. Prioritization becomes more difficult with the complexity of the thing being assessed, since it is easier to assess a smaller town that a large metropolitan area; but the available resources may be less for the smaller town. Once the prioritization is complete for each sector, the task begins of prioritizing across them. Using the individual family model again as an example, once the determination is made of those things critical, it becomes necessary to determine which comes first. Even in this very simple example, it may become advantageous to consider recovery time.

Recovery time can be situational to the event and other conditions, such as weather. Although in our family-level example drinking water is more critical than shelter, there are situations where this may not be accurate. Consider that the environment is one of sub-zero temperatures; shelter would take precedence over water. Consideration of recovery time works similarly. Consider that the loss of available drinking water could be remedied in a couple of hours, but having an available food source could take months. Prioritization would put food ahead of water, since the water is easily replaceable. Applying the principle of Maslow's hierarchy of needs to prioritization sometimes helps to understand and focus on what constitutes the critical, and distinguishes the essential from the nonessential.

Step 3—Protection: The third step in addressing protection of critical infrastructure is the outcome of the critical assessment process. The purpose of the critical assessment is to identify and prioritize, but protecting becomes another function. Still, consideration must be given to protection to determine if that process impacts the findings of the original critical assessment. This obviously hints that the process of critical assessment is not a single one but an ongoing reevaluation.

Critical Assessment Benefits

Utilizing critical assessment produces positive benefits. One benefit is heightened awareness of the value of assets and of threats and vulnerabilities opposing them. Another benefit is the realization of the true level of interdependence within the thing being assessed. There is also evidence that performing critical assessment promotes interagency and interdepartmental cooperation, again because of the understanding of interdependence that is made evident in the process.

Critical Assessment Evolution

There is little doubt that with the growing body of research and experience in critical assessment, there will be new tools introduced, and eventually there will be definition given to best practices. There is a growing number of educational programs offering higher education courses, even at the graduate level, in critical assessment. There is also a growing number of critical assessment professionals and private firms now contracting to perform services for those in both the public and private sectors. As the critical assessment process becomes more professional, there will likely be greater definition given to terminology, sector identification, and process. The performance of critical assessment must be evolutionary, but it is also true that the functional process itself is evolving.

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See Also: Classification of Systems; Commodity Shortages; Critical Applications; Food Security; Freshwater Demands and Shortages; Logistics; Resource Collapse.

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Cyber Crime

Cyber crime is a relatively new kind of criminal activity that encompasses all the ways in which computers and other types of portable electronic devices capable of connecting to the Internet, such as cell phones and PDAs, are used to break laws and cause harm. In a more technical sense, it refers to the use of computers or other electronic devices via information systems such as organizational networks or the Internet in order to facilitate illegal behaviors. Cyber crime has developed and evolved alongside the Internet and the proliferation of other advances in information technologies. The term *cyber crime* is sometimes used synonymously with technological crime, high-tech crime, Internet crime, and digital or electronic crime.

Although cyber crime has entered into common usage—discussed in political, criminal justice, media, public, and academic discourse in diverse sources including academic journals and newspaper articles—there are dramatically varied views of what cyber crime is. Legal definitions vary drastically among jurisdictions and law enforcement agencies charged with tackling it. In the academic arena, there is no consensus whether cyber crime is a new form of crime qualitatively different from “terrestrial crime” or instead consists of criminal activities pursued with new tools and techniques.

According to some authors, cyber crime takes place in cyberspace, a novel sociointeractional environment with certain features (the collapse of spatial–temporal barriers, many-to-many connectivity, the anonymity and plasticity of online identity) that make possible new forms and patterns of illicit activity, inexorably altering the relationships between offenders and victims and challenging the potential of criminal justice systems in order to offer satisfactory solutions requiring the development of a correspondingly innovative criminological vocabulary and conceptual apparatus. For skeptics, cyber crime is essentially the same as the familiar terrestrial crime, which means that there is no need for the development of new criminological theories.

This lack of consensus on a definition of cyber crime impacts every facet of prevention and remediation. On the other hand, there is significant confusion among academics, computer security experts, and users about the extent of real cyber crime, although research shows that the number of people and businesses impacted by various types of perceived cyber crime is growing, with no signs of declining. Cyber crime is a global problem that costs an estimated $50 billion annually. The number of victims and cost of cyber crime will inevitably rise with the number of Internet users.

Types of Cyber Crime

Definitions of cyber crime differ depending on the perception of both observer/protector and victim. The phenomenon also has many different facets and occurs in a wide variety of scenarios and environments. The Council of Europe's Cybercrime Treaty uses the term *cyber crime* to refer to various offenses ranging from criminal activity against data to content and copyright infringement. Gabriole Zeviar-Geese suggests that the definition is broader, including activities such as fraud, unauthorized access, child pornography, and cyberstalking. The United Nations Manual on the Prevention and Control of Computer Related Crime includes fraud, forgery, and unauthorized access in its cyber crime definition. Probably the most appropriate definition is that cyber crime is any crime that is facilitated or committed using a computer, network, or hardware device. The computer or device may be the agent of the crime, the facilitator of the crime, or the target of the crime; indeed, the crime can take place on the computer alone or in other nonvirtual locations.

Secretary of Homeland Security Janet Napolitano observes agents working to identify cyber crime activity and protect victims at the Immigration and Customs Enforcement's Cyber Crimes Center in Washington, D.C., on December 19, 2011.

Sarah Gordon and Richard Ford suggest that there are two main types of cyber crime. Type I, more technical in nature, has the following characteristics:

- It is generally a singular, or discrete, event from the perspective of the victim.
- It is often facilitated by the introduction of crimeware programs such as keystroke loggers, viruses, rootkits, or Trojan horses into the user's computer system.
- The introductions can be, but may not necessarily be, facilitated by vulnerabilities.

This type of cyber crime requires that data be protected from traditional threats such as viruses and worms; however, it is also necessary that users be cognizant of the concept of vulnerabilities.

More human in nature is Type II cyber crime, at the other end of the spectrum, which includes (but is not limited to) activities such as cyberstalking and harassment, child predation, extortion, blackmail, stock market manipulation, complex corporate espionage, and the planning or carrying out of terrorist activities online. The characteristics of Type II cyber crime are the following:

- It is generally facilitated by programs that do not fit under the classification of crimeware. For example, conversations may take place using IM (instant messaging) clients or files may be transferred using the FTP protocol.
- There are generally repeated contacts or events from the perspective of the user.

In reality, cyber crime presents a continuum ranging from a crime that is almost entirely technological in nature to a crime that is, at its core, entirely human related.

Because of the transnational character of cyber crime, there are significant law enforcement, regional, multinational, and global efforts to fortify the legal battle against cyber crime internationally. In 1990, the United Nations General Assembly adopted the Guidelines Concerning Computerized Personal Data Files, and it has endorsed several resolutions in order to improve cyber security awareness at both the international and the national levels. The General Assembly invited states to consider the measures in their endeavor to fight the criminal misuse of information systems, and it has decided to maintain the question of the criminal misuse of information technologies on the agenda of its future sessions. The Council of Europe Convention on Cybercrime is acknowledged as a landmark in the sphere of the international harmonization of cyber crime law.

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See Also: Cyber Security; Cyber Warfare; Denial-of-Service Attack.

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Cyber Security

The term *cyber security* denotes a number of activities, measures, and techniques developed to protect from attacks, service interruptions, and other threats to computers, computer networks, and information they contain and exchange, as well as software, data, and other elements of cyberspace. Therefore, this term refers to united efforts and attempts, which include research and analyses, with the aim of inventing new technologies and improving the existing activities related to the security of cyberspace and the level of its protection from cyber threats. Those activities can contain, for example, an estimate of reliability and vulnerability of the hardware and software used in critical infrastructures of a particular country. The concept of cyber security implies a holistic approach in research and confronting cyber threats to information systems—from standpoints of information and mathematic sciences and their special disciplines (like cryptography and cryptanalysis), and military, legal, crime, and criminology aspects.

Etymologically, roots of the term *cyber security* date back to the 1960s. At that time, communication security (COMSEC) was dealt with. When computers appeared, during the 1970s, computer security (COMPUSEC) came into being. In the 1980s, because of such threats as Cuckoo's Egg and Morris Worm, it was realized that a network consisting of a large number of computers could be used for malicious aims. That is when the integration of communication and computer security happened, so the term *information security* (INFOSEC) was coined. Information security has integrated disciplines that used to be separated, such as personnel security, computer security, communication security, and operational security. At that point, information security had already become one of the four cornerstones of U.S. national security (besides diplomacy, economy, and military components).

Definitions of Cyber Security

Today, there is no generally accepted definition of the term *cyber security*, but the terms *information security* and *information assurance* are part of a wider concept of cyber security.

The most widespread is the notion according to which cyber security is identified with information security, which refers to protection of information and information systems against being broken into, used, spread, or subjected to service interruptions, unauthorized changes, or destruction, with the aim of guaranteeing their confidentiality, integrity, and availability. The emphasis in information security is put on preventing unauthorized access to information systems. From this standpoint, confidentiality of information is the main consideration.

According to another, newer, approach, the term *cyber security* is identified with the term *information assurance* (IA). IA is defined by the National Security Agency of the United States as a number of measures for protecting and defending information and information systems by means of securing and assuring their availability, integrity, authentication, privacy, and nonrepudiation. It includes measures for backing up a system, its protection, detection that the system is being hacked, and reaction to attacks. Assurance represents the level of confidence that is proportional to the efficiency of additional measures of security. The introduction of this term, in a way, testifies to the change of the granite concept of security, typical for traditional information systems that were not connected to a network, toward a more flexible concept of security that on one hand, implies that the nature of cyberspace is against reaching absolute security and, on the other hand, is measured by the value of information and devices that have to be protected.

Information Characteristics

The progress in computer technology and ways of interconnecting computer systems has, thus, widened a list of information characteristics upon which security requests are put, regarding the concept of IA. From the point of view of information assurance, it is of great importance to fulfill the following information characteristics (or information security services and information systems): privacy or confidentiality, integrity, and availability.

Confidentiality of information can be related to national security (e.g., information about weapons), industrial security (e.g., projects relating to a new product), or the personal privacy of a user. Integrity aspires to ensure that information and resources commanding it (hardware and software) can be modified and destroyed only with a special and formerly defined authorization.

The aim of availability is to ensure that information and services related to it are at any moment available to authorized users. In other words, a system that offers such services has to function only when it is requested to, and in a limited and already scheduled time. From the operational standpoint, availability refers to acceptable system response time and appropriate quality of service. From the point of view of information security, however, availability means the ability to protect from a damaging event or the possibility of system backup in cases when the damaging event has already taken place. Availability of modern information systems, which are in a state of ceaseless activity, is required not only for regular activities of an information society but also for safety of human lives (it is enough to mention, for example, the systems that control air traffic or automated devices in an operating room).

Authentication is a measure of security with the aim to determine values and validity of transfer and message of sender. This measure also controls authorization of a user to receive specific categories of information.

Nonrepudiation is a measure of security with the aim to ensure the stream of communication. It makes sure that the sender of information has proof of its delivery, but at the same time, that the receiver has the information about the identity of the sender, so that none of the participants in the process of information transfer can later deny that the transaction was performed.

The level of importance of the mentioned information characteristics, from the security point of view, varies depending on the context in which information exchange takes place. In military systems, for example, confidentiality of information is of vital importance, wheras in financial transactions among banks, the emphasis is on integrity.

A Complex System

Cyber security cannot be separated from a general context in which an information society operates. It encompasses a wide range of activities and measures and thus represents a complex system, bearing in mind that it unites various but, at the same time, equally important aspects. That means that none of them can be neglected: if one part of the system received less attention, the whole system would stop functioning correctly. Such complexity makes it difficult to achieve an absolute level of security. It is not possible to eliminate completely a risk from inadequate, accidental, or deliberate use of instruments of the information era. Cyber security is, thus, above all, achieving control over the risk, continuously searching for a compromise among the value of what has to be protected, the level of protection, and the price of protection.

Achieving cyber security at a supranational level requires the synergic activity of all subjects of the international community, with a primary role for experts in the field of information sciences. Preventive activities for adopting hardware and software standards, establishing national and supranational expert bodies, improving international cooperation in this area, and adjusting national laws in the field of cyber crime are essential steps for improving security of cyberspace.

The need to develop concepts of "cyber security," on an international level, is especially highlighted in the Declaration of Principles, which was adopted by the World Summit on the Information Society in 2003. In the chapter of the declaration dedicated to building confidence and security in the use of ICTs, it is stated that for the development of an information society and creating confidence among the users of ICTs, it is necessary to strengthen mutual confidence, as well as information and security of computer networks, authentication, privacy, and protection of users. A need for promotion, development, and implementation of a global culture of cyber security through cooperation of all decision makers and international expert bodies is stressed. This effort should be supported by improving international cooperation. Within a global culture of cyber security, it is important to improve security and ensure protection of data and privacy of users, together with improving the possibility of access and trade. These activities, according to the declaration, must take into consideration the social and economic level of each country, as well as respect development-oriented aspects of information society.

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See Also: Critical Infrastructure; Cyber Crime; Cyber Warfare; Information Asymmetry.

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Cyber Warfare

The security of highly information-based societies, which in all their segments depend on computers and computer networks, can be jeopardized not only by physical threats but also by threats from cyberspace. That is why cyber attacks, in all technologically advanced countries, are perceived as one of the greatest threats to national security, and securing one's own national cyberspace is considered to be an absolute imperative. Cyber warfare is a particular and comparatively new form of social conflict. Activities of cyber warfare usually reduce to offensive use of cyber attacks, as well as taking measures of precaution and using tools for prevention of breaking into one's own systems. The main characteristic of this kind of conflict is that it takes place in cyberspace by means of software tools and propaganda techniques, as well as various techniques for deceiving an opponent's use of information-communication technologies, with the aim of causing damage to the opponent, his or her information infrastructures, and other mutually interconnected critical infrastructures, as well as the data contained in them. Although it takes place in a virtual world, cyber warfare can result in real material losses and human casualties if targets of those attacks are, for example, critical infrastructures or supervisory control and data acquisition (SCADA) systems for automated control of industrial processes. Cyber warfare can be waged independently or as a support to a conventional, kinetic conflict.

The Unique Nature of Cyber Warfare

Cyber warfare is, according to most of its characteristics and principles, different from conventional, kinetic warfare. One of the basic differences lies in the nature of their environments. Kinetic warfare takes place in a physical world and is governed by the laws of physics. Cyber warfare takes place in an artificial world that can hardly be predicted and is susceptible to quick changes. That is why only a few principles of kinetic warfare can be implemented in cyber warfare.

The term *cyber warfare* originates from the military discourse and is frequently identified with *information warfare*. That kind of identification is not completely justified because cyber warfare is only a variation of information warfare—the former term covers a narrower range of uses because it limits activities of information warfare to the space of computer networks. Today, many countries and their armies are developing doctrines and strategies of offensive and defensive cyber warfare and forming special units for performing information combat. In that regard, for example, as of October 2010, the U.S. National Cyber Security Strategy had been officially approved, and in the same year, the United Kingdom government announced a new national security strategy in which cyber warfare and terrorism were proclaimed the greatest threats to the country. During the North Atlantic Treaty Organization (NATO) summit in Lisbon in 2010, a new strategic concept of this organization was adopted. Among the most important aims, which should be realized by 2020, there is protection from unconventional threats, that is, updating the approach of the alliance for solving crises caused by such threats as terrorism, proliferation of the weapons of mass destruction, cyber attacks, and disruption of vital energy streams of supply. Article 12 says that cyber attacks have become more and more frequent, organized, and expensive from the aspect of the damage they cause to governments, businesses, economies, and, potentially, energy transport and supply, as well as other critical infrastructure. They pose a threat to the national and Euro-Atlantic security, stability, and development. Today, the term *cyber warfare* is used not only to describe military offensive and defensive activities in cyberspace but also as an umbrella term for denouncing a wide range of activities on individual, social, and corporate levels that are usually subsumed under cyber crime.

Actors of cyber warfare are numerable—they can be national armies, security and intelligence agencies, politically and ideologically motivated individuals, "hacktivists," various formal and informal subversive social groups (terrorists, criminals, and religious sects), and also business corporations competing against rivals for domination of the market. Sides in the conflict try to use any kind of system vulnerability or weakness (technical or human) of the victim. The arsenal of cyber warfare is very diverse and numerous—attacks are usually performed by means of malicious software (malware: virus, worm, Trojan horse, backdoor, spyware, keylogger, hijacker) and compromised computer networks (botnet) with the aim of causing a distributed attack targeted at service obstruction (distributed denial-of-service-attack (DDoS). In addition, in order to obtain administrator authorizations and other necessary information for initializing an attack, phishing techniques and social engineering are used. As objects of cyber warfare, data and information in electronic form, computer systems, and critical information infrastructure in general, can be identified.

Although activities of cyber warfare have been carried out for over a decade, an adequate legal definition for them still has not been found. The entire field of cyber law is still not properly developed. Some attempts at applying already existing models from international laws of war to this area have been shown to be inappropriate. Moreover, a general consensus on international agreements that would clarify the legal status of state and nonstate actors in cyber conflicts has not been reached.

Taking into consideration the lack of consensus regarding formal and legal ownership over the Internet, existence of national and regional developing disparities regarding approach to information-communication technologies, and the globally present battle for domination in cyberspace, a tendency of activity growth in the field of cyber warfare can be expected in the future, especially bearing in mind that the number of users of the global network is continuously growing while prices of computers, computer equipment, and software are falling. That makes the tools of cyber warfare widely available to all potential actors of cyber conflicts.

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See Also: Critical Infrastructure; Cyber Crime; Cyber Security; Interstate War.

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D

Damage Assessment

Assessment of disaster impacts is crucial to the many different aspects of response, recovery, and mitigation activities occurring post disaster. Not only must damage assessments be completed in a timely fashion for initial responders and search-and-rescue (SAR) teams, but they must also accurately quantify both areal extent and level (limited to catastrophic) of the disaster impact for higher-level decision making, long-term response planning, and recovery operations. Imprecise damage assessments can have dire consequences at all levels of disaster response and management. The criticality of damage assessments to U.S. disaster operations is evidenced in the Homeland Security Geospatial Concept of Operations. Damage assessments supported by location-based technologies such as geographic information systems (GIS), global positioning systems (GPS), and remote sensing (RS) are recognized as crucial missions and provide important components of the essential elements of information (EEIs), which inform decision-making processes during initial response and recovery operations and influence longer-term rebuilding and mitigation efforts. Incomplete or inaccurate assessments may slow the procurement and delivery of assets to the affected area and can lead to complex or complicated disaster events that sometimes result in even more devastating impacts in the long run. Damage assessments are part of routine emergency operations at the local level, but assessments for larger events that surpass local capabilities are not regularly trained for or undertaken in a standardized fashion from place to place. Different methods, achieved using disparate means and yielding divergent results, were not uncommon until very recently, when automated procedures began replacing flawed computations and human introduction of error and bias. This technologic innovation, although welcomed and useful, does not completely replace human intellect within the disaster decision-making process but rather provides a rapidly deployable additional resource to the emergency manager's arsenal.

History and Methods of Damage Assessment

The concept of understanding disaster impacts is not a new one. Chronicles of disasters, their damage to landscapes, and their effect on people can be found as far back as 9,000 years or more in old African cave etchings revealing details about prehistoric flood events. More detailed maps depicting spatial locations of disaster impacts can be traced back to both the 1854 London cholera outbreak and the devastating Japanese earthquake and tidal wave. Throughout human history, people have (for pragmatic reasons) become ever-entwined with disastrous places and subsequently have felt the impacts of hazard events. Lack of sufficient details on the scope and spectrum of a disaster's impact can have dire consequences for the entire disaster management cycle. Vast improvements in technology, communication, visualization, and spatial understanding have occurred since the first known "damage assessments," yet the premise of understanding the consequences of disaster remains constant. Comprehensive damage assessments that balance speed with the provisioning of adequate details are necessary for both short- and long-term response planning and operations. Decisions about which response assets to utilize during the initial phases of response are inextricably linked to understanding the impacts on individuals and communities in a disaster area. In the longer run, return and recovery can be managed more succinctly if plans are made based upon quality base (damage assessment) information.

Historically, a number of different types of damage assessment and varied methods for capturing, analyzing, and understanding damages across space have been invented, improved upon, and in some instances mandated as part of a larger emergency management process. Generally, these assessments fall into three main categories, each linked with the scale of disaster: initial damage assessment (IDA), preliminary damage assessment (PDA), and technical damage assessment (TDA). During every emergency event from a routine traffic accident to a major disaster occurrence, an IDA is conducted. Here, local emergency response personnel reconnoiter the area and begin mobilizing local and regional resources through memorandums of understanding (MOU).

Often, these IDAs are termed "back of the envelope" because they are routinely undertaken with both the greatest of haste and with resources at hand (i.e., back of an available envelope). IDAs are often completed by conducting a drive-through assessment where officials scour the area for a general understanding of the damages. If the disaster is large enough to overtax local resources (flooding, hurricanes, chemical spills, etc.) a preliminary damage assessment (PDA) is undertaken. Here, a more complete and fact-based (empirical) assessment of damages takes place that results in a tally of damages (both financial and from a volumetric standpoint) to buildings, businesses, infrastructure, and residents. Often, ancillary impact/damage data such as information from nonprofits (Red Cross and other volunteer organizations), hospitals, and the general public is included in PDAs. This type of assessment generally includes the use of aircraft so that officials can understand and estimate the scope of damages from a broad perspective. The PDA is a required step in the process of requesting a presidential disaster declaration (PDD) both in the United States and across the globe. Because the PDD is the means by which the federal government justifies and allocates financial and other disaster support assets to an area, the PDA must not only be accurate and complete but must also be undertaken rapidly. The final type of damage assessment—the technical damage assessment—involves very specific insurance and federal investigation into both the site-specific (house, critical infrastructure piece) causal agent of damage and a strict economic accounting of damages, losses, and costs of the disaster. The TDA is used both to identify appropriate reimbursement amounts and to plan operations for the often long road to recovery from disaster.

The Future of Damage Assessment

Until very recently, all of these types of assessments were completed and compiled by hand and used less-than-perfect technologies coupled with imprecise analysis where human bias was consistently introduced. Although the "first" people may have simply been telling a story about a specific event, such actions have evolved over time to include the most sensitive remote sensing technologies. A new advent of practice-oriented (rather than research-based) supercomputing is enabling real-time, on-the-fly damage assessment using remotely sensed imagery. Included in this ever-evolving science are three main advancements in the creation and utilization of remote sensing technologies. First, the sheer number of available "vehicles" for capturing remotely sensed imagery of the Earth is greater now than ever before. There were four times the number of satellites capable of capturing information about the Earth's surface launched into orbit around the Earth in 2011 than there were just 10 years ago (Figure 1). Although each of these has its own specific mission and capabilities, the fact

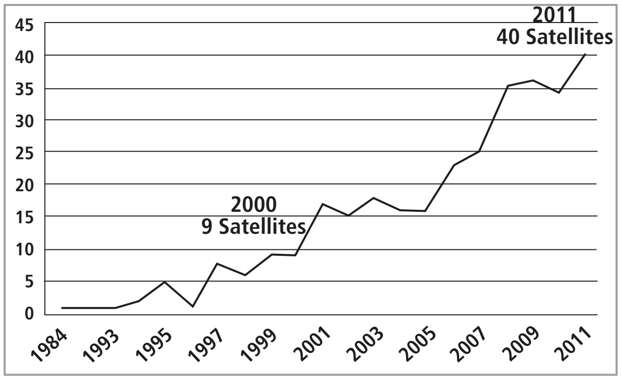

Figure 1 Total number of observational satellites launched since 1984

Source: Union of Concerned Scientists Satellite Database, 2012.

that more than 950 (known) observational satellites currently orbit the Earth helps us understand the sheer volume of Earth surface data being collected and analyzed across the globe.

Couple these with emerging capabilities related to local remote sensing using portable/unmanned sounding or imaging devices and the number of available assets in a post-disaster environment becomes countless. Utilizing unmanned aerial vehicles for the capture of remote sensing imagery and spatial data is perhaps the best example of this ever-evolving scientific field. Researchers have already begun the tenuous process of vetting this new technique and have identified numerous applications, including rapid deployment into hurricane impact areas where historical remotely sensed damage assessments have often taken days to collect and weeks to process into usable spatial data for decision making.

Applications of this technology have a lower cost, a more flexible ability to deploy assets, and a less time-intensive turnaround on final data products. However, although the cost of this new technology is lower than traditional in-flight data collection, it is not without cost. For this reason and the fact that the United States, other global governments, and private-sector partners have already deployed assets capable of the same data collection, there are other opportunities to access remotely sensed damage assessment data at little or no cost for disaster response activities. Numerous efforts are under way to speed access to useful remotely sensed data pertaining to crisis response. Among these is the International Charter–Space and Major Disasters (www.disasterscharter.org), which aims to provide a unified system of space data acquisition to mitigate the effects of disasters on human life and property. Additionally, the Remote Sensing Hazard Guidance System (RSHGS) (ww2.rshgs.sc.edu) developed through Department of Homeland Security Science & Technology (DHS S&T)–funded research at the University of South Carolina is a Web-based decision support tool supporting hazards managers in the process of acquisition and analysis of remotely sensed imagery for their area of interest.

RSHGS provides information on satellite resources and capabilities—an invaluable tool for incident commanders; however, under many disaster scenarios, satellite-based resources are not usable because of weather or atmospheric disturbances, creating more opportunities for the deployment and utilization of manned and unmanned aircraft. Although planners, emergency managers, and decision makers can now quickly identify informational needs about a hazard area quickly and accurately—both requisite characteristics of damage assessment needs—challenges still remain in provisioning these aerial assets in a timely manner. To be effective for life-saving missions, RS data and imagery-derived products must reach the frontline responders within 12 hours, and derived damage assessment products must be in the hands of community assistance and recovery teams within 48 hours to effectively support delivery of community rebuilding processes and aid critical sector restoration activities.

Missing Pieces and Opportunities

The sum of all the technology across the globe cannot make up for the fact that disaster/crisis events are often unanticipated and impact areas of the globe where residents are less than prepared. Couple this with the fact that we currently do not have a complete understanding of the true costs of disasters in the United States and around the world, and one quickly realizes that each piece of the emergency management puzzle is just as important as the others. Effective and efficient emergency response and long-term recovery may be in part based on quality damage assessments, but the process of creating replete damage assessments must begin long before the disaster event. Pre-impact planning based on efficacy in every aspect of emergency management provides the basis for quality response and recovery efforts in which complete IDAs, PDAs, and TDAs are made possible through unified multiple data collection, analysis, and assessment. Unity of knowledge, or consilience, across disciplines, sectors, agencies, and the general public, coupled with information about losses from a central loss repository, will enable responders and decision makers to understand past and future damages, calibrate models, and create new techniques—not simply for damage assessment but also for the larger community of responders, emergency personnel, and citizens.

Formal incorporation of location-based technologies into the emergency management life cycle is a prerequisite for developing a culture of preparedness that sees location-based technology as a necessary component for ensuring that the right information gets to the right people at the right time. This delivery of real-time information and data informs our understanding of crisis events, producing better decisions, and the routine testing of these capabilities creates a culture of preparedness and a technical state of readiness for sustaining life-saving, damage assessment, and recovery and mitigation missions.

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See Also: National Response Framework; Pre-Impact Planning Process; Response.

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Damage Containment

Damage containment—often referred to as "damage control" or just "containment"— is identified by most emergency management researchers as the most often overlooked aspect of emergency planning. Planning for damage containment is as an element of mitigation and actually occurs in two stages. The first stage is in planning for future disasters, and the second is in responding to an event.

Planning for Damage Containment

Each situation presents a different paradigm of planning for damage containment. In the case where a new structure is being planned, the concept of damage containment can be applied in site selection. There are obvious things that should be considered: selecting areas outside established floodplains; avoiding building on slopes of hills where tall grass, brush, or timber may dry and a fire develop (fires tend to naturally climb hillsides); building in high-crime areas; and other considerations particular to the facility being built.

Once a suitable site is selected, planning for damage containment should continue in determining materials and design; a bank and a cardboard box factory require different levels of design and structure. Structures can be designed specifically to resist earthquakes, wind (even tornados and hurricanes), fire, and flooding. Different levels of security as well as fire suppression can be designed into the building. Installing redundancies into systems is a way of lessening the damage that can occur in a system loss. The level of security and safety that can be built in is determined mainly by the budget available for building.

Some buildings are designed to accomplish damage containment by keeping the danger confined to a specific area. Some are designed to prevent fire from spreading from one area to another. Nuclear power plants are designed to be locked down and sealed to prevent the escape of radioactive materials.

Damage containment usually refers to an attempt to confine damage to a certain level within a certain area. The *Titanic* was deemed unsinkable, not because of special hull strength, but because of the use of bulkheads that were designed to contain any flooding that might occur. Ships

Case Study: Chernobyl—Planning and Response Damage Containment

On April 26, 1986, in Chernobyl, Ukraine, which was then a part of the Soviet Union, the world watched a major nuclear disaster play out through the obscured lens of Soviet secrecy. The Chernobyl nuclear power plant suffered an explosion and fire that released huge quantities of radioactive materials into the environment. The accident was caused by an electrical power failure that resulted in a loss of necessary water transfer to keep the radioactive materials at a controlled temperature.

Nuclear power plants are designed with thick concrete and steel housing intended to contain radioactive materials, even in the event of an accident, provided there is sufficient water exchange to keep the temperature within certain parameters. Tests had revealed a flaw in the backup electrical plans, resulting in a power gap that would allow the radioactive materials to super-heat.

The actual cause of the disaster was explosion and fire, but it was most assuredly a series of events and failures that led to the single greatest nuclear accident in history. One of the major contributors to the destruction was the Soviet practice of keeping secrets even from their own people. Instead of evacuating the nearby towns, there was no discussion about the accident itself, and assurances were given that all was normal. Responders were not given the needed information to make a proper response, so containment efforts of firefighters proved fruitless.

In the post-Soviet days, more has been learned about the event. Evidence indicates that poor planning and design of the nuclear facility led to ineffective containment barriers. The roof of the facility was not constructed according to design specifications, which allowed radioactive materials to escape as a result of the explosion and fire. The uncontained explosion threw large pieces of graphite fuel rod channels out of the facility and onto responding firefighters and emergency response personnel; these materials were extremely radioactive. The firefighters and other emergency personnel had not been properly trained to respond to a nuclear explosion and fire, nor were they equipped to protect themselves from the radiation.

The containment effort continued until May 10, 1986, when the fire was eventually extinguished in the reactor core. This was accomplished through a massive effort that involved using helicopters to drop 5,000 metric tons of materials onto the burning reactor itself. The materials included boron (which absorbs neutrons), clay, sand, and lead. In addition to the material that was air-dropped, responders pumped liquid nitrogen directly into the reactor.

Nuclear material was spread over a rather large area, but fallout spread across a huge region of the Soviet Union and eastern Europe. Estimates have placed the potential death toll at more than 200,000 persons, but whatever the number, the incident continues to claim victims through deaths resulting from radioactivity-induced cancers.

Chernobyl represents a model of what goes wrong with poor planning in design and response, coupled with ineffective response measures.

The Chernobyl power plant reactor number 5 sits ghostlike in October 2011, 25 years after an explosion and fire caused the single greatest nuclear accident in history. The event also became a prime example of nearly everything that can go wrong within planning, design, response, and damage containment. The design of the facility led to ineffective containment barriers, emergency personnel had not been properly trained for or protected against a nuclear accident, and the Soviet government withheld critical information.

and submarines are still designed with watertight bulkheads designed to be closed to contain flooding or fire to a specific area. Damage containment can also be accomplished through designs to keep hazards from entering; a double-hulled ship is an attempt to confine the damage to the exterior skin and not allow water into the larger body of the ship.

Some buildings are designed to accomplish damage containment by preventing external hazards from entering the building; these buildings can shutter themselves to prevent toxic fumes and poison gases from entering. This is damage containment through design to restrict hazards from entering buildings. Schools, hospitals, and residence care facilities are the most common structures of this design. The building has the capability of being completely sealed, augmented by positive internal pressures. The air supply is recirculated through cleansing filters designed to detect toxic and poisonous substances.

Another form of planning for damage containment can be accomplished through segregation of assets; this is referred to in risk management as "spreading risks." One of the more common mistakes in discussing the concept of spreading risks is to confuse the term with "sharing risks," which is the use of insurance. Spreading risks literally means putting assets in different locations so that no one event can destroy everything. This recalls the adage "don't put all your eggs in one basket." In investment planning, a common strategy is to spread money across different opportunities to avoid one failure causing a total loss of assets; the same concept applies here. Damage containment through spreading became more popular following the events of September 11, 2001.

Many of these provisions may be viewed as costly, but nothing saves response and damage costs more than preventing an event altogether. If an event cannot be totally prevented, lessening the damage is the next most advantageous attempt. Properly planning for damage containment can pay for itself many times over in stopping one event. Prevention of an event is the ultimate damage containment.

Damage Containment Through Response

Obviously, the best of plans are sometimes foiled by acts of nature, human failure, or intentional design. Should an event occur, adequately planning and equipping for a response is the next stage of damage containment. Auxiliary equipment can be installed to provide advanced damage containment, but properly trained personnel can enhance the cause further. Installing advanced firefighting equipment and emergency medical devices (such as portable automatic defibrillators) can help defer damage, but having employees trained to operate the equipment properly adds to the level of protection. The training and prevention programs may be augmented further through the employment of practice drills and exercises. These exercises should be coordinated with response agencies to allow for verification of correct addressing of alarms and 911 call systems; an incorrect auto-address assignment can be easily discovered in a coordinated exercise, but left undiscovered can become an element of disaster.

In a response, damage containment often requires resourceful thinking and innovative response measures. The very nature of damage containment during response means that the situation is not under control, and this tends to be a very-high-risk period of the response. Once damage containment features are in place, the response will shift to extinguishing the event completely; this is true of all disasters, whether human-made or natural.

One of the more memorable attempts to bring a disaster under control during the response phase is the Chernobyl nuclear reactor accident of 1986, but there are examples of damage control in response for every disaster.

Damage Containment Methods

There are a variety of methods for accomplishing damage containment during a disaster response. These include utilizing specially designed materials and devices, such as oil containment booms, petroleum-eating bacteria, spill-absorbent materials, temporary liquid barriers, and new innovations that are being introduced all the time. During the BP Gulf of Mexico oil disaster of 2010, specially designed ships were deployed that collect oil-contaminated water and clean it through a filtration system, retaining the oil for refining and returning the water to the ocean.

Damage containment methods for forest and grassland firefighting can include removing potential fuel sources to create a fire break, applying fire retardant materials to block the path of the fire by denying it fuel, and reverse burning to cause a small controlled fire to move against the larger uncontrolled one to remove fuel and oxygen from the larger fire.

Almost every disaster has some methodology designed to help contain damage and bring the disaster under control.

Psychological Damage Containment

A growing form of damage containment is psychological damage control—working to prevent long-term mental health issues in victims and responders alike. Psychologists are increasingly finding evidence of post-traumatic stress disorder in victims of natural and human-made disasters. Once thought to be a product of battlefield action only, its recognition in victims quickly led to acceptance that responders also suffer from the disorder.

Many response agencies now offer psychological counseling and stress debriefing exercises for both victims of and responders to natural and human-made disasters. Here again, this works best with preplanning and special training. Research indicates that responders are more likely to participate in post-event counseling and debriefing exercises when these are made a part of their training programs.

Conclusion

Damage containment saves lives, property, and money. Effective damage containment is a product of proper planning, design, and the equipping and training of personnel. Perhaps the most important aspect of damage containment is to encourage innovation in the methods used to bring an event under control.

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See Also: Disaster Drills; Disaster Risk Reduction; Insurance; Prevention; Response; Strategic Plans.

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Dams, Levees, and Seawalls

Dams, levees, and seawalls are all barriers against water. A dam blocks the flow of water for the purpose of impounding it, generally storing it in a reservoir, sometimes with the additional benefit of yielding hydroelectric power. Levees manage water flow and redirect it away from protected land regions, such as the settlements around a body of water; they either occur naturally or are constructed, usually parallel to the course of a river, but sometimes following the shore of some other body of water. (The word originated in New Orleans, Louisiana, where levees are constructed around Lake Pontchartrain.) Similarly, seawalls are constructed around the coast to reduce coastal erosion and protect habitats and human settlements from wave and tidal water.

Seawalls

Seawalls are expensive to construct but provide a more long-term solution to coastal management than does maintenance of beaches. In many locations, a choice must be made—constructing a seawall often requires destroying the beach. Furthermore, wheras a seawall can be constructed to protect inland habitats, it can also destroy shoreline habitats, many of which—such as wetlands and intertidal beaches—are especially fragile and key to the planet's biodiversity. Seawalls that replace beaches also jeopardize recreational tourism and quality of life for locals. The conventional wisdom is that although beaches provide some protection from coastal events—they form a buffer between the shore area and inhabited areas—seawalls do a much better job of minimizing property damage and hazards to human life in extreme events like tsunamis or hurricanes. This wisdom has been challenged by recent events. Forty percent of Japan's coastline was lined with seawalls and similar structures when the 2011 Tohoku earthquake and tsunami struck, damaging the containment buildings of the Fukushima nuclear power plant. These seawalls were a key component of postwar Japan's initiative to introduce nationwide infrastructure that provides a rigorous defense against earthquakes and tsunamis.

However, reliance on the seawalls to do their work may have allowed standards to be more lax in other areas of building than if the seawalls were not there. Fukushima's diesel generators, which powered reactor cooling systems during shutdown, were positioned on the assumption that the coastal seawalls would prevent flooding. They did not—waves rushed over the seawalls. At least some of the damage at Fukushima would have been preventable had more of the plant been designed with the possibility of a seawall failure in mind. As many critics have pointed out since the tsunami, the efficacy of seawalls is hard to quantify because the extreme events that put them to the test happen so rarely.

Levees

Like seawalls, levees primarily protect land areas from water. The levee system in New Orleans has often presented problems. During the Great Mississippi Flood of 1927, when the Mississippi basin was hit by heavy rains and the rivers swelled to record levels, 30 tons of dynamite were detonated on the levee at Caernavon, Louisiana, during a torrential rainstorm in order to keep the levees around New Orleans from spilling over. New Orleans escaped serious damage, but neighboring St. Bernard and Plaquemines Parishes (counties) were significantly flooded. It was thought to be a fairly clear-cut case of poor black neighborhoods being sacrificed in order to spare rich white ones, and the same charge was levied against the involved governments in 2005 following the failure of the levee system during Hurricane Katrina, which disproportionately affected black neighborhoods. There is no evidence of a conspiracy in that more recent case; the rumors of such simply evince the poor state of the levees. Their failure was responsible for more of the damage in New Orleans proper than the hurricane wrought directly. Both independent investigations and the Army Corps of Engineers' own reports showed that the levee failure resulted from a faulty design. The natural forces exerted on the levees were well within the limits of what the levees were intended to withstand; a National Science Foundation investigation found evidence that the Corps was aware of these design flaws no later than 1986. As with the Japanese seawalls, one of the problems with a levee system is the choices that are made on the assumption that it will work; in this case, the existence of the levee system almost surely influenced the delay in calling for a mandatory evacuation and may have influenced the choices of some of those who chose to stay, when weighing the expense of departure. It undoubtedly also influenced design choices made in the city, and the city and Orleans Parish's choices in budgeting for and designing disaster protection plans, since the maintenance of the levee system had been assumed by the Corps and its efficacy was treated as a fait accompli.

Dams

Dams, on the other hand, generally are built not to protect from disaster but to control water level, whether the principal aim is to maintain a reservoir, generate hydroelectric power, or limit water flow in order to render land habitable. A dam failure is a catastrophic event, enough so that in times of war, the laws of armed conflict forbid the targeting of dams in inhabited areas. Prior to the adoption of this law, the British Royal Air Force targeted three German dams in World War II's Operation Chastise, in order to hurt Germany's infrastructure and manufacturing capacity. Dam failures can be caused by natural disasters, erosion, or geological instability, but often the cause is anthropogenic: the 1972 Buffalo Creek flood in West Virginia killed 125 people as a result of design failure four days after its satisfactory inspection; the 1985 Val di Stava dam collapse killed 268 when negligent maintenance allowed sediment to build up and warp a drainage pipe; and in 1889, the South Fork Dam in Pennsylvania failed because of a poorly designed spillway. The resulting flood of Johnstown was the first major disaster relieved by the newly formed American Red Cross.

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See Also: Damage Assessment; Disaster Assessment; Disaster Drills; Drought; Earthquakes; Evacuation; Floods; Preparedness; Prevention.

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Data Mirroring

As individuals, organizations, government entities, and corporations prepare to deal with potential disasters and crises that may arise, data mirroring has come to represent increasingly important practices, policies, and procedures for these groups. Data mirroring involves the replication of data stored on logical disk volumes on separate physical hard disks, often in real time, so that continuous availability of that data is ensured. Data mirroring provides several advantages in crisis management situations, insofar as it protects data in the event of hardware failure, but it also significantly improves system performance with regard to speed. More sophisticated systems of data mirroring permit data backup to occur while the first disk remains active.

Storage Replication

In the event of a disaster, either natural or human-induced, having the information technology (IT) systems that support a business or organization secure is of vital importance. Since the 1970s, when business leaders first began to understand the increasing importance that constant access to data meant to their organizations, interest has developed in providing a safe and reliable means to safeguard data. Beginning in the late 1970s, companies such as Sun Information Systems (later known as SunGard Data Systems) began providing backup computer systems that would preserve a client's data in the event of a disaster. Such endeavors provided what is known as hot site/cold site locations. A hot site is fully equipped to permit an organization to resume operations after a disaster; a cold site does not have that capacity but does preserve data that would otherwise be lost. Organizations that preserved their data at hot or cold sites made a cost-benefit analysis that assisted them in deciding what sort of backup arrangements were needed. These determinations are made as part of the development of a disaster recovery plan.

Disaster recovery plans focus on various control mechanisms that can assist in reducing or eliminating various threats to an organization's operations. Disaster recovery plans are generally a subset of an organization's continuity planning. As such, disaster recovery plans need to include planning for resumption of applications, communications, data, hardware, and other IT infrastructure. In the event of a major crisis or disaster, plans to replace personnel and facilities and to augment communication must also be considered. Strong disaster recovery plans consider three aspects: preventive measures, detective measures, and corrective measures. Preventive measures include those steps that are taken to prevent an event from occurring, such as precluding flood damage or power outages. Detective measures involve using controls to detect or discover unwanted events, such as monitoring systems for computer viruses or hacking. Corrective measures are those that involve restoring the system after a disaster so that operations may resume in a timely manner.

When considering an appropriate disaster recovery plan, organizations must consider appropriate recovery point objectives (RPOs) and recovery time objectives (RTOs). An RPO involves the maximum tolerable period in which data may be lost from an IT service because of a crisis. RPOs provide system operators a guideline for planning for backup services; for example, if the RPO were set at six hours, daily backup would be inappropriate. An RTO represents the duration of time in which a certain process must be restored after a disaster or other interruption of service. RTOs generally include time to fix the problem, the recovery itself, testing, and communication of the problem to users, as well as a return to full service. Data mirroring is a means of providing continual backup of data, thus permitting an RPO of zero lost data.

Data Mirroring

Storage technology that employs multiple disk drives to achieve data mirroring is sometimes referred to as "redundant array of independent disks" (RAID). RAID is a method of storage virtualization, a means of providing very fast and very reliable data storage. First developed at the University of California, Berkeley, by David Patterson, Garth A. Gibson, and Randy Katz in 1987, RAID was soon marketed commercially as a means of providing quick and safe data protection. Originally, there were five RAID levels, each of which indicated basic RAID configurations, each with relative benefits and failure rates. Data mirroring is generally synonymous with RAID 1.

Disks are an inherently unreliable component of computer systems, with the average disk having a 5 percent probability of failing within five years. To remedy this, RAID 1 creates an exact mirror (or copy) of data on two separate sets of disks, which do not have to be housed at the same location, thereby increasing the reliability of the data storage. This setup is most useful when read performance, or reliability, is more important than data storage; as such, an array can only be as large as the smaller of the two member disks. Because each disk contains a complete copy of the data and can be read independently, reliability of the system is raised by the power of the number of self-contained copies. If only one disk fails, no data are lost. Although a RAID 1 system provides effective protection against physical disk failure, it is not effective in combating computer viruses, accidental file changes, or deletions. To provide better protection against such harm, any data mirroring system must also be combined with a robust backup system. Some systems store a series of backups so that inappropriate changes can be fixed if needed. Remote backup services are often used to prevent the loss of data in the event of a disaster. Continuous data protection systems allow a system to immediately log every change on the host system; it differs from data mirroring in that it allows a rollback of the log.

Mirroring may take place locally, where it specifically protects against disk unreliability, or it may be done remotely. When mirroring takes place remotely, it generally forms part of a more sophisticated disaster recovery system. Certain data mirroring systems combine both local and remote mirroring, usually to protect high-availability systems that have a large volume of users. Data are usually mirrored onto a physically identical drive, although sometimes the process is applied to logical drives that are different, as the fundamental physical format is hidden from the mirroring process. Although data mirroring was initially a hardware solution using disk arrays, it now also can use software within the operating system. Several possibilities exist when a disk fails. In a hot swap system, the system itself diagnoses a disk failure and signals the system administrators. If the system is sophisticated enough, it automatically sets in motion a hot standby disk and utilizes the functioning active disk to copy live data to this disk. Failing this, a new disk is installed immediately to replace the failed disk, and data are copied onto this disk. In less advanced systems, the system operates on the remaining disk until a spare disk can be installed with minimum disturbance. Some data mirroring systems utilize three or more disks, with two of the disks used for the redundancy mirroring and the third disk utilized for backups. The third disk is sometimes referred to as a business continuance volume (BCV).

When data are copied from one disk of a mirror to another, the process is sometimes called “resilvering,” which is a rebuilding of the data. During the resilvering process, system performance is interrupted or significantly degraded, as the disk system is fully occupied in the process of copying data from the remaining disk to another. Mirroring of disks must be augmented by regular backups. Although many organizations utilize frequent and comprehensive data backups, this is especially important for commercial entities, as user mistakes, processing errors, and hacking are not protected by data mirroring. Rapid data links, such as those provided by fiber-optic links, allow data mirroring to take place site to site, especially if the distance is 1,500 feet or less. For remote data mirroring, asynchronous copying systems are often used.

In addition to preserving additional copies of data, mirroring allows separate disks to be accessed individually for reading purposes. Many large organizations maintain multiple mirrors for this purpose, because in the case of a disaster or other crisis, several tasks may compete for data on the same disk. Data mirroring permits faster downloads of data accessed via the Internet, and many corporate and other organizational users utilize mirrors dispersed geographically to improve performance. Data mirroring also helps organizations to balance the load on their servers, which can be helpful if a disaster strikes and causes an upsurge in usage in a certain region.

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See Also: Alternate Site, Corporate; Backup Strategy; Cyber Security; Data Recovery; Disaster Risk Reduction; Operational Readiness.

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Data Recovery

The purpose of data recovery is to create and maintain the ability to recover data that are required to perform one or more necessary functions. Prior to designing data recovery, the functions must be prioritized and the required data identified. Recovery objectives are defined, including the recovery time objective (RTO) and the recovery point objective (RPO). The RTO is the length of time a function can operate without the data, and the RPO is how old the data should be when they are recovered. After these recovery data requirements and recovery objectives are determined, processes are put in place to back up and recover the required data meeting the recovery objectives. After all the processes are in place for backup and recovery, those processes are tested regularly to ensure they will work properly when needed. Data recovery is an activity that is authorized by the crisis management process.

Business Impact Analysis

Necessary functions are identified using a business impact analysis (BIA) or a similar tool for nonbusiness purposes. The BIA lists the functions performed and prioritizes them in order of most important to least important. Another determination is the RTO for each function; usually, the more important the function, the shorter the RTO. Then the RPO is determined by understanding the maximum age of the data that must be recovered. At times, functions cannot continue if they must start again with recovered data that are too old. This also helps determine the backup and restoration processes that must be used. Typically, the shorter the RTO and smaller the RPO, the more expensive data recovery will be.

Along with the BIA are financials that state the various costs of all functions not working. Quantifying how much revenue will be lost or how much cost will be incurred while waiting for the data to be recovered helps tell how much to spend on the data recovery processes. Typically, the higher priority a function has, the more it will cost in revenue or other costs to be without the function. Conversely, functions with a low priority typically don't garner much revenue or cost much to be without for extended periods of time. Of course, when this information is presented, it is up to the highest-level decision makers to determine how much they are willing to spend on data recovery to mitigate the identified costs. With an approved spending threshold, the data recovery processes can be determined. At times, the data cannot be recovered within the approved spend threshold. If that happens, the decision makers must decide whether they want longer RTO and RPO to avoid the cost of data recovery or provide additional funding to accomplish proper data recovery.

Armed with the entire set of requirements and objectives from the BIA and the spending threshold, the data recovery processes can be designed. The first part to design is the data backup. Longer RTOs and RPOs allow less expensive backup and recovery designs, while shorter RTOs and RPOs require more expensive backup and recovery designs. The data must be backed up in a format that can be recovered according to the RTOs and RPOs.

Recovery Objectives

Very short RTOs and RPOs make it necessary to design a high-availability (HA) environment where data are used or stored in two geographically separate locations at the same time. HA environments allow either location to be destroyed with little to no loss of data and little to no recovery time. Of course, the people performing the function must also be HA so that the entire staff is not disabled with the single location. Short RTOs and RPOs provide some leeway in design. There are backup processes called "replication" that back up data from one location to another, called a hot site, with dedicated equipment ready to be used. When the original location goes down, the replicated site can come online in the amount of time it takes to bring the systems up using the replicated data. Data recovery can take from minutes to hours.

Medium RTOs and RPOs allow backup and recovery of more moderate expense. Knowing the amount of data to be recovered helps as well. Many backup and recovery options have estimates of backup and restore data transfer speeds. This means it is possible estimate the amount of time it will take to back up and also to restore the data during recovery. For example, if the data transfer rate is 3 billion characters per minute and the data to restore amount to 300 billion characters, then the restore will take about 100 minutes.

If the data transfer speed meets the RTOs and RPOs, the design will work well for the recovery. When designing for data recovery in the medium RTO and RPO range, a warm site can be used. A warm site is an alternate location with equipment in several different states of readiness. Some equipment is powered off, waiting to be used, and other equipment is powered up and ready for use, as well as leaving space for equipment that can be shipped for longer RTOs and RPOs. In many cases faster tape backup and restore devices are used, allowing recovery in one or more days.

Longer RTOs and RPOs offer even more choices. A cold site is an alternate location with no powered up equipment—often just an empty shell of air-conditioned, raised floor space. The use of a cold site is the least expensive choice, other than doing nothing, but again, it requires RTOs and RPOs of days or longer. The option of preconfigured equipment shipped quickly to the cold site can provide an affordable recovery option. Again, often tape backup and restore media are used, and even slower, less expensive devices can be obtained. Another option is to recreate systems from the install and either reenter data or start fresh, entering older data by hand as time permits.

Bunkers

One final option is to avoid losing data and also avoid having the cost of equipment just for recovery. One choice that meets these criteria is known as a bunker. Just as the U.S. military used bunkers to protect assets, a business can use a bunker to house its existing systems and data. Because the bunker is impervious to all natural hazards and most human-made hazards, there is only the need for the equipment used on a daily basis. No extra cost for backup equipment for alternate site recovery is needed, no HA site, no cold site, no warm site. The only drawback is that everyone must access the site through network connections that may go down; but redundant connections and redundant telecom vendors in the site can allow a quick switchover to an alternate network vendor.

Backup Media

Some other things to consider are the different forms of backup media. There are two major types of backup media: optical and magnetic (electronic). The possible environmental threats that the backup media would be exposed to should help determine which media are used. Optical media tend to be stored on reflective material in a plastic substrate, such as compact discs (CDs) and digital video discs (DVDs). These optical media are susceptible to damage from scratches, heat, and ultraviolet rays from the sun over prolonged exposure. Magnetic media such as tapes and external hard disk drives (HDD) are susceptible to electric surges and strong magnetic fields as well as string X-rays that may be found in airport baggage scanners.

Whichever backup media are used, there should be periodic backups to acquire several versions of information just in case one medium is destroyed or cannot be recovered properly. There are several types of periodic backups using media. Often, there will be a full backup once a week or once a month followed by daily incremental backups. Incremental backups hold only the small amount of information that changed that day. Recovery would first need to restore the full backup to get all the information and then apply incremental backups to bring the data to their most current state.

Older media backups should be kept track of so they can be destroyed or converted as newer media replace older media. Some media backups should be stored off-site to protect them from harm during disasters. There are many off-site storage vendors that even have climate-controlled storage rooms to prevent condensation from forming within the media containers and damaging the media.

Conclusion

One of the activities that can be authorized by crisis management is data recovery. The purpose of data recovery is to create and maintain the ability to recover data that are required to perform one or more necessary functions. To design a good recovery, there must be a business impact analysis that prioritizes each function, identifies the required data, and determines both the RTO and RPO. Once the requirements and priorities are set and agreed to by decision makers, a cost threshold for the design is determined and the design is conducted using standard recovery options such as hot sites, warm sites, and cold sites or bunkers. After design approval, the design is implemented and then tested regularly to ensure it will work properly when needed.

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See Also: Backup Media; Backup Strategy; Business Continuity Planning Life Cycle; Critical Business Functions; Data Mirroring; Dedicated Site.

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Debriefing

Crisis managers understand that the damage does not end with the event; for instance, the effects of the September 11, 2001, terror attacks are still being discovered and evaluated. One very important post-event component of crisis management is the debriefing, or post-crisis analysis. Debriefing exercises usually are conducted shortly after the event, and sometimes again after participants have had the opportunity to rest and refresh themselves from the event, which allows reflection time. A debriefing exercise has multiple purposes, depending on how it is structured, and with proper planning can be beneficial in many ways. These include experiential learning, event reconstruction and investigation, screening for post-traumatic stress disorder (PTSD) and other mental health issues, public confidence building, and research.

Experiential Learning

Debriefing and post-crisis analysis are used in experiential learning. Debriefing individuals involved in a crisis event, whether as victim, respondent, or nonparticipating witness, leads to information that helps in the development of training and education for future events. In this type of debriefing, the questions center on words like who, what, where, when, why, and how. The purpose is to collect experiences within the framework of understanding what happened, what things could have been done to lessen the impact of the event, and how to avoid or prepare for future events.

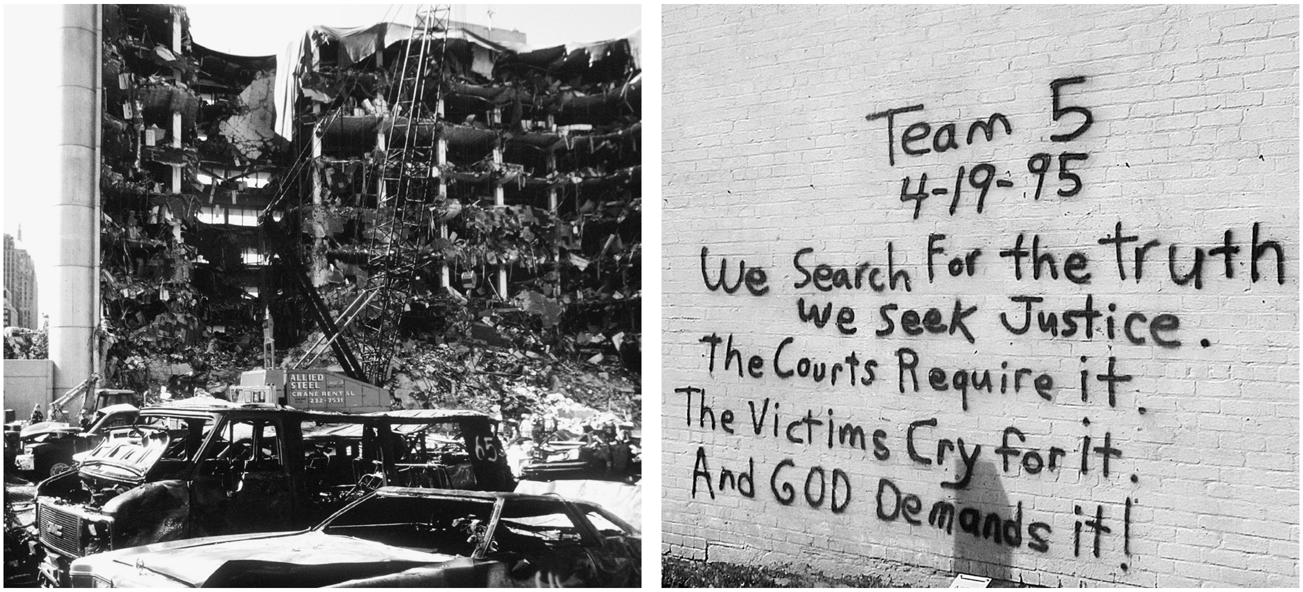
Post-crisis analysis may go beyond debriefing to include a review of archival information, such as newspaper reports of the event, photographs of the event and of the affected area before and after the event occurred, post-event maps, weather and geological data from the time of the event, official reports, and even the diaries of persons involved. Depending on the age of the event, there may also be an attempt to collect archaeological and anthropological information, such as has been done in the study of early and prehistorical events.

The findings are used to assist planners in developing more informed responses to future crises of a similar kind, if not in the same location. Trainers use the information to revise or design new programs or to develop practical exercises and drills, to inform the public about protective measures, and to help responders prepare for future crises. Educators use the information to develop course curricula for developing emergency managers.

Experiential learning can also occur immediately, using a debriefing session following the critical incident. Generally, because of the need for expediency, the session is a very basic discussion between those involved about what happened, what caused the event, how the crisis played out, and who did what during the event. As participants tell their stories, the facilitation can develop a discussion about how the response could have been improved; the purpose in these sessions is not to belittle or ridicule but to collectively learn a better approach to future incidents, or even how to avoid a similar event altogether.

Event Reconstruction and Investigation

Debriefing for event reconstruction and investigation has been done since before recorded history; investigators seek to put the stages of an event into an order that can be understood and give meaning to the specifics being reviewed. The desire to investigate and determine what happened in the



The charred hulls of automobiles remain in front of the bombed Alfred P. Murrah Federal Building in Oklahoma City two days after a car bomb exploded inside the building on April 19, 1995 (left). Rescue Team 5 spray-painted a message (right) on a brick wall nearby in the aftermath of bombing. This was a sentiment echoed during the post-crisis analysis and debriefing process, which helped investigators to reconstruct the attack, determine the cause, and identify a suspect.

process and cause of an event (post-crisis analysis) is a natural human instinct.

In modern times, new investigative abilities have improved post-crisis analysis. The process of reconstructing critical events has been greatly improved with the development of computer-aided design (CAD) and other digital imaging advancements. Using eyewitness accounts, known data, and digital imaging and design, investigators can reconstruct the crisis event and explain the multiple causes of an event. Having the ability to input known data to determine if it fits into the models developed from debriefing helps investigators know where to look for more clues. As an example, the multiple causes of the sinking of the *Titanic* are becoming clearer with the help of the ability to observe the debris and enhance computer modeling.

Information from post-crisis analysis (investigation) and reconstruction helps investigators not only to determine the causation but also to develop suspects in cases where the crisis appears to be a criminal or terrorist event. Post-crisis analysis, including information obtained from debriefing eyewitnesses and physical evidence, helped investigators to reconstruct the devastating attack on the Alfred P. Murrah Building in Oklahoma City in 1995 and to demonstrate the plausibility of the single device explosion.

Screening for Mental Health Issues

Counselors use debriefing of victims, responders, and eyewitnesses in post-crisis analysis to identify emotional welfare concerns. The debriefing is the second-level contact with persons directly involved in a crisis event, the first being "defusing." Defusing is often confused with debriefing, but it occurs immediately following a crisis event, at the scene, and is essentially an outreach to explain the normalcy of the feelings being experienced, and to provide a communications lifeline for access before the debriefing occurs.

Emotional welfare debriefing usually occurs within hours of a critical incident. Depending on the situation, the debriefing may be done individually, one-on-one with a counselor, or in a series of group sessions; the determination of method is based on the type and scope of the event. The International Critical Incident Stress Foundation (ICISF) has established guidelines for conducting debriefing of this kind. The ICISF debriefing process follows seven steps: The intervener introduces self, establishes guidelines, and invites participants to introduce themselves, making clear that participation is voluntary (although attendance itself may be required); details of the event are developed from individual perspectives; emotional responses are given subjectively; discussions look at personal reaction and actions; this is followed again by a discussion of symptoms exhibited since the event; there is an instructional phase where the team discusses the symptoms and assures participants that most are a normal reaction to an abnormal event and that these should diminish with time; and this is followed by a brief period of shared informal discussion, most often done in a relaxed atmosphere, often with nonalcoholic drinks and snacks. The participants are then allowed to return to duty and resume normal tasks. Throughout the ICISF process, the intervener is attempting to identify individuals who are not coping well; these participants are offered additional assistance. This debriefing process is usually followed by intervener visits with participants; again the purpose is to ensure that proper coping patterns are being followed.

Unfortunately, there is some evidence from research that indicates that critical incident stress management itself has little benefit for victims, responders, and witnesses of critical incidents. However, there is also evidence that the debriefing itself, the talking about the incident, allows participants to identify with each other and develop self-help networking.

Public Confidence Building

Debriefing is a method of building public confidence in the ability to address issues of crisis management and response. In this form, those conducting the debriefing collect the stories and evidence relating to the critical event. The information is analyzed by the government or responsible organization to identify those practices that worked well, those that need improvement/alteration, and failures that can be attributed elsewhere. The focus is to use debriefing exercises to demonstrate concern for the public and environment through pre-event preparation, planning, and training; interest in the welfare of the general public and responders; and dedication to being better prepared for future events. Classic corporate examples of using the debriefing process in this way can be found in the *Exxon Valdez* and British Petroleum Gulf oil spills.

One side benefit of this paradigm of debriefing is that the organization learns firsthand and early what those involved will be repeating to news media and in other public forums, allowing for “damage control.” A second side benefit is that the organization can develop an understanding of any health issues (physical and/or mental) that may be forthcoming as a result of the event. Another benefit is that the organization can use the debriefing process to demonstrate concern to the affected persons.

Although this form of debriefing for damage control may seem questionable, these are common practices for both government and private organizations and have proven effective in reducing the impact of an event on them.

Research

Post–critical event debriefing works well for qualitative research into the various stages of a critical incident. The researcher has a distinct advantage in being a part of the debriefing team but can also benefit from recordings and documents collected during debriefings when the researcher is not a part of the team. There are lessons to be learned, and benefits to research activities, from debriefing sessions conducted for all of the other purposes. In conducting research into the crisis event, the investigator develops themes that correlate across the observations and stories from the participants. These themes can be explored further against the backdrop of the physical evidence available, or the information can be developed solely as experiential.

In this kind of research, the investigator may answer questions about perceptions of surviving the critical event, which training related to the response to the critical event, and many similar questions. There are many cases where such research was not the motivation of investigator involvement in the debriefing, but as the information collected was processed, themes developed that led to deeper understanding and/or new knowledge of benefit to others.

Post-Crisis Analysis Separate From Debriefing

There are many aspects of post-crisis analysis that are distinguished from debriefing, and the post-event analysis can continue for many years beyond the event itself. Such an example is the Chernobyl nuclear plant disaster that occurred in 1986. Although the debriefing phase is long past, the post-crisis analysis continues. Data collected immediately following the event and during the response are being analyzed in new ways to develop deeper understandings of what went wrong, how the response could have been more effective, and what the long-term effects are to human life and the environment.

Another excellent example is the *Columbia* space shuttle explosion that scattered debris over east Texas and west Louisiana in 2003. The National Aeronautics and Space Administration (NASA) is still collecting and analyzing debris from that critical event. There have been repeated studies done on locals in the area to determine health, particularly focusing on increases in cancer rates of people living in the debris field and those responding to the cleanup/collection effort.

Such post-crisis analysis can include field research as well as testing in a laboratory. In this form of analysis, highly specialized technicians and investigators seek to determine causation in an effort to avoid future events.

Conclusion

Debriefing is a part of post-crisis analysis but plays the central role in reviewing a crisis event. This is because the debriefing process includes participants who were victims, responders, and witnesses to what occurred. Even in recent times, investigators are going back and reading the papers, diaries, and texts of interviews with *Titanic* survivors. The stories, drawings, and observations reanalyzed provided new insight into what happened in this tragedy of passenger shipping. Some of this information has led to new theories about the ship's underwater resting place, and the evidence collected from the scene of the debris field has yielded new clues. Some of the evidence has shown that early statements of survivors about what they saw, once dismissed as confusion, are now supported by debris findings.

Debriefing and post-crisis analysis play an important role in the emotional healing process and future mental health of those involved in a crisis event. Another important contribution is to the improved knowledge of how to prevent and better respond to crises. Debriefing can serve many different functions in the post-crisis period.

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See Also: Blame, Politics of; Documentation; Emergency Responders; Journaling; Post-Traumatic Stress Disorder; Public Image.

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Debris Management

Debris management is a critical but understudied phase in disaster response and recovery. Indeed, of the top 10 most expensive disaster recoveries in United States history (measured in terms of federal relief funds expended), six occurred in the last 10 years—and all were debris-inducing events. Debris management refers to the process of planning for, removing, and disposing of debris induced by disasters.

- Pre-event planning consists of activities associated with identification of debris removal capacity in at-risk areas, as well as forecasting of debris fields and estimation of personnel and equipment requirements
- Debris removal consists of activities associated with identifying and removing debris from public (and sometimes private) land and waterways

- Debris disposal consists of recycling, destroying, or otherwise disposing of debris that has been removed

In all of the above phases, advanced technologies are increasingly being used to support (and sometimes substitute for) debris management activities accomplished by debris management personnel. As has been amply documented elsewhere, large-scale debris-inducing events continue to pose considerable challenges for efficient, effective, and equitable debris management activities.

This article reviews the major phases of debris management, with particular emphasis on current practices and likely future challenges.

Pre-Event Planning

Pre-event planning encompasses three activities: advance contracting, temporary debris storage and reduction (TDSR) site screening and selection, and debris field forecasting and estimation. Advance contracting identifies a single contractor responsible for debris removal in a specific area. This contractor is then responsible for contracting and managing any debris mission in its region. TDSR site screening is used to identify geographic areas that are appropriate for temporary storage of debris. Debris field forecasting and estimation occurs in the days or weeks before a debris-inducing event in order to estimate resulting volume, distribution, and composition of debris. Forecasting models are often embedded in computer-based tools used to guide decisions about initial activation of debris removal personnel and equipment.

Debris Removal and Disposal

The debris field may consists of a potentially wide variety of material distributed over the landscape. Debris is typically cleared from property and roadways and pushed to curbside, where it is segregated and loaded onto trucks and trailers at designated pickup points by debris removal teams. Loads are then delivered by truck to temporary debris storage and reduction sites (TDSRs), and their size estimated. Highly distributed teamwork is central to the organization of the debris removal mission.

The three broad stages of debris removal are identification, pickup, and reduction. Concurrent with activities in these stages are monitoring and reporting of field conditions. Debris pickup may have several subphases, including a first pass to open main arteries for emergency vehicles, clearance of rights-of-way such as secondary roadways, and clearance of debris from private property. In the United States, debris removal from waterways is likely to require coordination of organizations such as the U.S. Coast Guard. At some point, the debris removal operation is declared to be completed. Key measures of performance effectiveness are likely to include incremental (e.g., daily) and overall volume/weightage of debris removed, as well as progress in reducing the volume of debris at TDSRs. To support the debris removal mission, new techniques and technologies have been developed for tracking debris loads and estimating their size. These may range from small, handheld devices that function much like bar code scanners to more sophisticated technologies that will "X-ray" the contents of the hauling vehicle.

Debris disposal activities include recycling, burying, or burning various types of debris, both nonhazardous and hazardous, as appropriate. Given the volumes that may be generated by large-scale events, as well as difficulties in segregating materials in the debris stream, recycling continues to pose a challenge to debris management. Similarly, affected areas may be limited—due to environmental and other regulations—in their ability to burn or bury some types of debris.

Conclusion

Recent disasters such as Hurricane Katrina in the United States in 2005 and the 2011 earthquake, tsunami, and nuclear "triple disaster" in Japan have highlighted debris management challenges associated with scale, scope, and type of debris. In the coming years, debris management is expected to become more integrated into the overall emergency management cycle. Indeed, efforts are under way, both in the United States and abroad, to revisit long-standing practices in debris management, whether in the development of guidelines for best practices or in the development of new technologies.

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See Also: Disaster Recovery; Hazardous Waste Disposal; Preparedness.

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Debt Crisis

A debt crisis occurs when borrowers' margins of safety have eroded to the point where borrowers are unable to meet their scheduled debt obligations and risk a default without intervention. Although the term generally refers to macroeconomic, nation-state actors, global financial organizations have long been involved in debt crises, and the underlying phenomena may also apply to individual actors.

Typologies of Crisis

More broadly, a crisis is a type of social change where individuals, organizations, and society face widespread exceptions over a relatively short duration. Crises often serve as focusing events for media, the public, and policy makers to pay attention to a certain problem and to attempt to resolve the problem through some sort of collective action. Thus, a key component of a crisis is the relatively short duration when the exception occurs, media and the public pay attention, and policy makers are willing to dedicate time and resources to attempt to resolve the problem. Within economics, a crisis is commonly referred to as a dramatic and painful deviation from a well-established norm.

Over the past three centuries, a variety of economists, philosophers, sociologists, political scientists, and policy makers have offered various typologies of crises related to debt. Many of these typologies have highlighted banking panics, stock market crashes, financial bubbles, currency crises, and sovereign defaults as separate types of debt crises. Perhaps the most notable of these individuals was Karl Marx, who argued that capitalism was the first system in human history where overproduction was possible. Once overproduction occurred, Marx reasoned that it can set in motion a vicious cycle of reactions leading to falling profits, investment declines, increased debt, unemployment, and deflation. For Marx, a crisis did not result in the collapse of the capitalist system, but rather enabled the system to survive periods of fluctuation through increased consolidation, ultimately making the system more unstable in the long run.

More recently, scholars from the 1960s onward have sought to conceptualize what is a crisis, identify crisis symptoms, and attempt to offer integrated solutions, or at least attempts to ease crises for those most vulnerable. During this period, one of the more influential of these "crisis theorists" was James O'Connor, whose work sought to identify crisis tendencies in capitalism and the increased consolidation and integration of private and state actors in contemporary capitalism. O'Connor was among the first to argue that as the private sector runs into debt crises, the state must play an increasing role in resolving these problems. As the state becomes increasingly involved in the capital system, profits tend to be privatized, while economic risk tends to be disproportionately borne by the state. An additional important aspect of this analysis is that nearly every social group wants resources from the state, but few, if any, groups want additional taxes, creating a gap between revenues and expenditures, known as the fiscal crisis of the state. This fiscal crisis of the state tends to lead to other forms of social crisis. O'Connor's work heavily influenced the social philosopher Jurgen Habermas. Habermas offered a highly influential view of crisis as a systemic problem in capitalism resulting from "steering problems" between economic, political, and sociocultural actors. Over time, these unresolved steering problems may lead to economic crisis, rationality crisis, legitimation crisis, and motivation crisis.

More recently, economic scholars Carmen Reinhart and Kenneth Rogoff have conducted empirical analyses of economic downturns across centuries and concluded that that there are five "varieties" of financial crises: external default, domestic default, banking crises, currency crashes, and inflation outbursts. Although all of these financial crises are useful for comparison between crises over time, all of these typologies and categories are largely symptoms of debt crises rather than exploring the mechanisms that are similar across all types of financial crises.

Debt Crises and Financial Instability

Building upon prior research on debt and finance by Joseph Schumpeter and John Maynard Keynes, the economist Hyman Minsky offered an alternative approach that could more adequately explain the origins of instability and the importance of debt in understanding crisis. In Minsky's view, social organizations create an evolutionary process of invention, innovation, and obligations. For each unit, whether a household, a firm, or a national economy, these obligations appear as liabilities on the balance sheet and determine a series of prior, current, and future obligations that constrain or facilitate future opportunities. Because investment and debt obligations play a central role in understanding the financial system, banking, in the broadest sense of the term, including bank intermediaries, offers a useful starting point for understanding the overall workings of the capitalist system.

For Minsky, the debt-income relations of finance break down into three ordinal categories from stable to fragile. First, "hedge finance units" are those that can fulfill all payment obligations with their cash flows. The greater the income relative to debt on the balance sheet, the more stable the financial unit, and the greater the number of hedge finance units in the financial system, then the more stable the financial system. Second, "speculative finance units" are those that can meet their payment commitments on income accounts even though they cannot repay the principal with their cash flow and, consequently, must roll over their debt obligations at specified times. In this instance, when a firm recently purchases a new capital good and can make regular payments but cannot pay off the asset all at once, the firm is said to be a speculative financial unit, as debt on the capital good must be rolled over at a specified interval, whether it be at the end of a month, quarter, or year. Because a bank would be relatively inefficient if all of its cash flows exceeded its debt, or amount loaned, most banks fall into the category of speculative financial units. Third, "Ponzi finance units" are those whose cash flows are not sufficient to fulfill either repayment of the principal or the interest due on outstanding debts from cash flows. In this instance, Ponzi units can either sell assets or borrow additionally to meet prior debt obligations; however, a unit engaged in Ponzi finance lowers the margins of safety it offers to holders of its debt obligations. It is important to note that Ponzi finance does not necessarily mean the financial arrangements of an institution are fraudulent or deviant—it simply indicates that this type of borrowing may not be sustainable in the long term and these financial arrangements are more susceptible to market conditions, such as increases in wage or construction costs or increases in interest rates or short-term market fluctuations. Generally, the greater the number of speculative and Ponzi finance units in the system, then the more fragile the financial system.

The financial instability hypothesis begins with the proposition that in the capitalist economy, finance occurs within a system of borrowing and lending based upon the "margins of safety," or the ratio of cash flows relative to debt obligations. When hedge finance units dominate the economy, there is general stability in the financial system. Over time, speculative or Ponzi finance units may offer innovations not traditionally found among hedge finance units. Because innovation is an essential aspect of the capitalist economy, hedge finance units may invest in the development of instruments and markets that enable higher levels of profit to be financed. In return, borrowing units assure those who finance them that the money will be available at the appropriate time requested. This success of prior hedge investments into speculative and Ponzi finance units breeds confidence, additional borrowing, and additional economic expansion. During this period of economic expansion, additional borrowing tends to result in a decline in hedge finance units and an increase in speculative and Ponzi finance units.

Over time, this period of economic expansion may lead to economic euphoria and a belief that a new era has arrived, where increasing short-term financing of long positions becomes normative.

Once an investment boom starts, the volume of funds demanded increases and the rapid expansion of investment straps “liquidity,” or the amount of capital available to be borrowed. During this period, debt-to-equity increases, margins of safety erode, and a generalized belief may emerge that these developments are not cause for concern. The reason for this is that as innovations gain increasing acceptance, output, employment, and firm profits increase, leading many economists, financial experts, and policy makers to believe that hedge finance units were justified in their decision to invest in financial innovations. This period may also be characterized by a disregard for the possibility of failure, and in the absence of serious failure, this leads to further support of the exuberant economy. During this exuberant period, warnings that there is a financial breaking point that will lead to a crisis are ignored because of such profitable circumstances. Additionally, because critics may not have quantitative data to support future predictions that differ so drastically from the contemporary reality, their claims and unconventional wisdom are easily dismissed and ignored by the established authorities of economics, finance, and policy.

However, delays or unforeseen exceptions lead to additional unanticipated erosions of the margins of safety. When these unanticipated erosions occur, additional borrowing is required, or firms may engage in balance sheet adventuring to avoid disclosing their actual exposure to risk. Once this occurs, speculative and Ponzi units, debt laden and reliant upon borrowing to meet current obligations, must attempt to shore up their financial positions and may have difficulty doing so as additional questions may arise about their financial stability. The two most frequent sources of unanticipated erosions of the margins of safety stem from the long gestation of capital-intensive projects and financial innovations that fail to produce the projected levels of output. The financing of positions may also be complicated whenever short- and long-term interest rates rise, and new valuations must occur. In an effort to shore up financial positions, more stable hedge and speculative units may request additional capital from borrowing units. Speculative borrowing and Ponzi finance units, which are entirely reliant upon the servicing or sale of debt to meet current obligations, must use their margins of safety, which may quickly disappear once selling of liabilities evaporates and short-term financing is still necessary to meet current obligations. Because Ponzi finance routinely results in a continuous erosion of equity, Ponzi financial units may no longer become rare and the financial system becomes increasingly fragile as the ratio of Ponzi finance units increases. As an increasing number of units are unable to meet debt obligations, firms may attempt to merge, be acquired by other financial units, or request lender of last resort action from the federal government.

Finally, at this point, a break in the boom occurs, leading to a debt crisis, or as is more commonly reported, economic or financial crisis. The extent to which the financial system will enter a recession or depression depends largely upon the overall liquidity relative to government policy and lender of last resort actions by the government. Lender of last resort interventions almost always follow an explosion of speculative and Ponzi finance, and generally, once a lender of last resort intervention has occurred, hedge finance units, burned by their previous speculative or Ponzi finance investments, build up their margins of safety once again, to the point where the cycle may repeat.

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See Also: Bankruptcy, Corporate; Business Impact Analysis; Cascading Crisis; Fraud; Information Asymmetry; Resource Collapse; Resource Management; Risk; Stock Market Crises; Strengths, Weaknesses, Opportunities, Threats and (SWOT) Analysis.

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Decision Making

One of the most important responsibilities a leader has is the power of decision making. Especially during a crisis, the ability to make decisions becomes extremely important and essential for leaders and responders. Decision making can be defined as the process a person goes through in order to make the choices he or she needs during a crisis. This skill can be one of the most important skills a leader has in a crisis situation and is often one of the first things followers or team members will look to as a quality for their leader.

With all of the stresses brought to a crisis situation, the ability to make decisions becomes harder because of the additional burdens resulting from what has happened. A crisis will bring time pressures, risks, and an ever-changing situation, and seldom will the crisis responder be able to control the timetable of the event. The people who make the decisions in the crisis will have to make many difficult decisions and will ultimately be responsible for those decisions once the situation has calmed down. Often, the decision makers will express self-doubt, lose their own perceptions of the scenario, or cause stress upon themselves about the decisions that were made in the heat of the crisis.

It is important that when decisions are made, they are made quickly and decisively. The first consideration should be people's safety, and the decisions that are made need to be communicated precisely to those who need the information. Frequently, the decisions will need to be made quickly with little or no information available, but it will be the responsibility of the crisis leaders to do their best to make the most informed decisions they can as rapidly as possible. Most decisions will not be easy to make and may even be based upon conflicting information. These decisions will need to be prioritized in importance and communicated appropriately.

Making a Decision

When a decision needs to be made, it is best to make the most informed decision possible. The decision maker will need to decide what the desired outcome will be and design multiple choices to try and attain that outcome. In order to make the best decision, it will be important to utilize data and documents, other team members, and experts' opinions to decide which of the choices will be best. Rules, regulations, and policies will need to be considered and weighed into the decision-making process. After examining all of the possible factors, the decision maker will need to make a choice between the different choices created in order to achieve the outcome.

During a crisis, time will often be a major factor in the decision-making process. Time must be accounted for by the decision makers, and at some point a decision must be made in order to move on. It is important that clear communication channels and access to resources have been established before the incident in order that a timely and correct decision can be made during the actual crisis.

Decisions Before the Crisis

One of the most important decisions to be made is to plan for the crisis before it happens. The decision to create a crisis management plan in advance, choose a crisis team, and practice scenarios in advance will give people the opportunity to become more aware of what crises they may face and allow them to practice sample decision making. During the actual crisis may not be the best time to think and second-guess decisions, so by thinking in advance about some of these decisions and their long-term outcomes, the decision maker may be better informed to make the necessary decisions.

During an actual crisis, the decision maker will often have only a short amount of time, with limited resources and information, to make the decisions he or she will need to make. With proper utilization of the training and preparation in the pre-crisis phase, the decision maker will become more skilled and aware of the right decisions he or she may have to make if an actual crisis were to happen.

Difficult Decisions

During a crisis, those who are responsible for making decisions will often have to make difficult decisions. This responsibility can be a heavy burden on some, and not everyone is willing to be placed into a situation where he or she will be accountable for decision making. The person making the decision will have to take responsibility for the outcome of those decisions. Because of this difficulty, the person making the decisions needs to make the most well-informed decision possible. This can be done by collecting information and data, talking with experts and counsel, not making assumptions, thinking about outcomes, and looking out for the safety of people and the protection of property.

Case Study: Decisions Made at Louisiana State University During Hurricanes Katrina and Rita

During Hurricanes Katrina and Rita, the campus of Louisiana State University was impacted not only by the damage caused by the storm but also by evacuees from New Orleans and other southern Louisiana towns. Operation of the university was disrupted, and administrators had to make many decisions regarding the sustainability of the institution and how to handle the institution's role in the crisis. Administrators at all levels had to make decisions regarding the operation of their particular units.

One of the important decisions that had to be made for the university was if and when the campus would reopen. The campus had suffered damage, athletic facilities now housed evacuees, parents and friends were living with students in their residence halls, other students and faculty had left town to avoid the storm, and many people throughout the city were still without power. Many staff and faculty members were volunteering in the relief effort and not doing their regular tasks. State and federal governmental agencies were on campus using facilities, and the military was a constant presence on campus. With all of the chaos on campus, administrators began to wonder if the university would ever reopen for normal business.

Administrators began to realize that if the university did not reopen shortly, the university would not be open for the semester, if not the year. It was decided that the university would open for classes on the eighth day after the hurricane. This was not an easy decision to make. University officials had to gather information and opinions from many people involved with running the institution. They had to make sure their facilities were operational, faculty and students could get back to the classrooms, and operations could return to normal. They looked at their options, knowing they would be questioned by many for returning to normal operations, which included everything from classes to athletic events. Some felt the university should remain closed in this time of crisis and continue with humanitarian efforts.

Additionally, a decision was made to open up the university to the University of New Orleans, another school within the system, so it could hold classes, along with admitting students from other New Orleans institutions that had to be shut down. Decisions were made to diverge from normal policy to enable the temporary admission of students from other universities for enrollment until their institutions returned to normal operation.

These were only two of the larger decisions that had to be made to restore operation of the university. During any crisis, many difficult decisions will have to be made. The outcome of those decisions may not be known until much later. At the time, many people thought the university reopening for normal operation was not the correct decision, and it was a hard one to make. However, time showed that the hard decision to reopen the university was the right choice.

Not everyone will agree with every decision that is made. Decisions will often be challenged, especially if they are controversial or if they have an impact on certain groups. Often, these challenges may come from those outside the organization, from groups such as stakeholders and the media. A well-informed decision-making process may be the best defense to any accusations. In the end, only in hindsight will people be able to know if the decision made was the right one.

Wrong Decisions

Even with much planning and forethought put into the decision-making process, wrong decisions will occur. With decisions being so crucial during a crisis, wrong decisions will often have a very drastic impact. Stakeholders and the media will often focus on the wrong decisions, even if there were very few, rather than concentrate on the correct decisions that were made. In the end, it is important for the crisis leaders and responders to take actions and make the decisions that will be needed, even if the decisions are later determined to be the wrong ones. Often, making a wrong decision will still be better than making no decision at all in a crisis.

When a wrong decision has been made and identified, the person who made the decision should be honest, apologize about the decision, and explain his or her decision-making process and how and why he or she made the wrong choice in that given situation. Once the decision maker recognizes that he or she has made the wrong decision, the decision maker should take the necessary steps to correct it. In some cases, it may be determined after the fact that it was the wrong decision, but it still would be in the best interest to explain that a mistake was made and proceed with taking whatever corrective measures may be necessary to right the wrong. Realizing one has made the wrong decision during a crisis is not the time to worry about one's own ego or the perception of others. It is best to admit the mistake that was made and to go about correcting this mistake.

Decisions for the Greater Good

One characteristic of decision making that is often expressed by those who have to make hard decisions during a crisis is to make a decision for the greater good. Often, during a crisis, decisions may need to be made that would go against the normal rules, regulations, and procedures one would follow during a normal situation. A decision may need to be made that would "bend" these regulations in order to do the greater good and protect or help the most people. In a crisis situation, ethical and moral responsibilities may override the rules and regulations that have been put into place to regulate day-to-day operations.

If a rule or regulation is broken when a decision is made to do the "right thing" and help people, one can hope that it will be judged to be the right decision in the best interest of people. That does not mean that a person would not be punished or reprimanded in some way for making the decision at that time.

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See Also: Backup Strategy; Brain Drain; Bureaucracy; Collaboration; Command and Control; Contingent Coordination; Coordination; Criticality Assessment; Decision Making, Theories of; Decision Making Under Stress; Decision Stream; Decision Support Tools; Disaster Assessment; Emergency Operations Center; Evacuation; Hazard Mitigation; Improvising; Incident Management; Incident Response; Panic, Nature and Conditions of; Strategic Plans.

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Decision Making, Theories of

Decision making is the series of cognitive processes, by an individual or group, that selects an option—a choice or an opinion—from a set of possibilities. Formalized processes of decision making exist in a finite sphere—an election is a formalized decision-making process requiring candidates (the set of possibilities) to register and restricting such registration to a set defined by eligibility requirements, followed by a narrowing of the available options through the primary process, culminating in a vote that is then carried out by the electoral college and results in a binding choice. More simply, choosing an item for dinner from the menu is a process that exists in a finite period of time; the item is chosen, delivered, consumed, and paid for, and the process ends. But cognitively, decision making is a continuous process, a layer of the mind's interaction with the environment; the outcome of the election, or the taste of the meal we ordered, informs the choices we make next time. Regret, or opportunity loss, is the difference between the positive outcome we experience and the positive outcome we could have enjoyed if we made another choice, and some decision makers become motivated by attempting to avoid regret.

Decision making is affected by cognitive biases and emotional processes and may be rational or irrational, informed by tacit or explicit assumptions. Though much attention is paid to formalized, explicit, and therefore conscious decision making, most decision-making processes occur unconsciously—even when we are aware we are in the process, we rarely consciously examine the factors going into it or dwell much on why we may "just feel like it" when we make a particular choice like what to wear on a given day or what to eat for dinner. The mind's ability to engage in information-intensive decision-making processes without calling conscious attention to doing so, and without requiring the conscious engagement of the self, is an important adaptation—but it can lead to poor choices, which in crisis situations or for those in leadership positions is especially critical.

Decision theory is the study of decision making in terms of the rationality and optimality of the decision, and is pursued mainly in psychology and economics, especially with a prescriptive bent—that is, in the hope of identifying the best decision in a given situation, rather than descriptively analyzing the mechanisms of decision making without determining an optimum. Decision theory has a tendency to describe many decisions in textbook terms that are neater and tidier than what is found in the real world, and in this way differs from behavioral economics; decision theory will sometimes discuss binary decisions between two choices, like in the Prisoner's Dilemma or Pascal's Wager, which are rarely found in real life.

Although the ins and outs of decision theory overlap considerably with the modern science of game theory, many of its concepts originated much earlier, and the core concept of "expected value" was popularized by 17th-century French mathematician Blaise Pascal. In what is now called Pascal's Wager, Pascal described the relative outcomes of theistic and atheistic worldviews in terms of a decision, one that "bet" on a particular assumption (there is a God, or there is not) being correct. Decision theory now calls that scenario an example of choice under uncertainty, the class of scenario with which decision theory is principally occupied. Pascal's assumption was that the reward for theism was infinite if correct, and therefore belief in God was the pragmatic choice because disbelief offered no comparable reward; although the wager made many logical missteps and was founded on too many tacit assumptions to be useful to anyone in a genuine spiritual crisis, the framework of the argument was nevertheless compelling, and it anticipated elements of modern behavioral science that would not be explicitly formulated and identified for some time.

Causal Versus Evidential Decision Theories

Two opposing schools of thought in decision theory are causal decision theory and evidential decision theory. The causal school weighs the "expected utility" (a game theory term that replaced the older "moral expectation"—both terms refer to the positive outcome of a decision and its likelihood of occurrence) of an action in terms of that action's consequences. The evidential school weighs expected utility according to the best outcome that can be expected for the actor (the decision maker). The difference may sometimes seem negligible; what is key is the causal school's need for the actor's action to be the cause of the positive outcome. In the classic game theory example of the Prisoner's Dilemma—in which each of two individuals is told that if he betrays the other, he'll go free and the other will receive a long sentence, while if neither betrays the other, each will receive a short sentence—the causal school is unable to come to the same conclusion as the evidential school (that the actor should remain silent), because the actor's action is unable to influence the other actor's decision and so may be irrelevant to the outcome.

One of the concepts in decision theory that has a large impact on crisis decision making is ambiguity aversion or uncertainty aversion, a preference for known risks over unknown risks. Ambiguity aversion, for instance, is one of the factors that keeps people working at jobs they dislike, in relationships that don't make them sufficiently happy, or living in areas they know are unsafe—because while they know they are in a nonoptimal situation and have exposed themselves to a risk of negative outcome, they are also familiar with the situation and its risks, whereas a new situation would include many unknown elements. Risk aversion is similar but is specifically a preference to avoid risk even if that means limiting positive outcomes; ambiguity aversion prevents the actor from choosing options that may have very low risk, as long as the outcome is sufficiently ambiguous. Although women are more risk-averse than men, there is little gender difference in ambiguity aversion.

Another pitfall in decision making, especially in organizational decision making, is analysis paralysis, in which a decision is never made because the explicit decision-making process becomes overly detailed and cumbersome. Although individuals are prone to this as well, in organizations analysis paralysis can be the result of the need of an employee or executive to appear to be doing something, and when enough people are involved in the decision-making process, that can result in an overabundance of extraneous or overly granular information provided to the process, so that each person has a chance to make a contribution and tangibly demonstrate his or her involvement rather than simply register agreement with another person's input. Another way that analysis paralysis can occur is when every possible option includes the expectation of some amount of negative outcome. Rather than choose among negatives, no one is willing to appear to be supporting any negative outcome, and so decision makers circle around and around, unable to come to a decision that will minimize the negative outcome—or unable to do so in time for it to matter. In emergency management, there is a risk of this occurring when the situation is such that there is no choice that can be made that will solve everything; rather, priorities must be made, and decisions made accordingly. One of the main objectives of the professionalization of emergency management has been to avoid analysis paralysis in emergency management institutions.

Group decision making often leans toward consensus decision making, which bases its decisions on the consent of group members rather than on their agreement or on the advocates' ability to address objections to the decision. The goal of consensus decision making is to avoid adversarial decision making, so that there is no "winner" and "loser" in the process. Dissenters may have the option to formally declare their reservations or stand aside rather than block the decision.

Prospect Theory

Prospect theory is similar to decision theory but is descriptive rather than prescriptive and is part of behavioral economics. Prospect theory examines decisions actors make between options that involve a reasonably understood level of risk (rather than focusing on decisions made in conditions of uncertainty). Daniel Kahneman was awarded the Nobel Prize in Economics in 2002 for his work introducing prospect theory, which was originally described in terms of the decision-making processes involved in buying a lottery ticket.

Sense-Making and Situational Awareness

Sense-making is an important cognitive process involved in decision making. The term was coined in studies of human-computer interaction, but has been applied more broadly to the process by which people assign meaning to their experience–that is, "make sense" of it. Sense-making is the process of responding to the cognitive gap as the individual confronts observed data, especially when the individual is aware of an inadequacy in his or her understanding. In organizational science, sense-making is discussed as occurring on the organizational level rather than in the mind of the individual. Identity—who people think they are—is critical in organizational sense-making, which becomes a social activity as narratives are shared that could explain the data, with the most plausible narratives embraced by the group. Sense-making is increasingly recognized as a key process in understanding the cognitive processes of crisis management and critical decision making.

Situational awareness is another process that affects the information to which the actor has access in order to inform his or her decision. Situational awareness is the actor's perception and understanding of his or her surroundings, spatially and temporally, and of changing variables in those surroundings. It is often discussed in the context of emergency services, as police and firefighting personnel often arrive on a quickly changing scene with which they must engage; so, too, in the military and in aviation. Situational awareness can come from the actor's own perceptions or can be supplemented by information provided externally, such as being told where in a building a fire started, or on which floors people are known to be trapped, or by examining the building's blueprints. Sense-making is a process of engaging with data; situational awareness is the product of that process.

In contrast with decision theory, the naturalistic decision-making (NDM) movement began in 1989 to focus descriptively on the process of decision making rather than to analyze the optimal choice. Whereas decision theory weighs various approaches of decision making, NDM focuses on cognitive processes like situational awareness and sense-making, and the effects on the actor of factors like resource constraints, time constraints, high-stakes consequences, vagueness in specifying objectives, and the actor's experience level.

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See Also: Agency Notification and Mobilization; Bounded Rationality; Chaos Theory; Cognitive Novelty, Engaging in; Crisis Management, Emerging Trends in; Decision Making; Decision Making Under Stress; Decision Stream; Decision Support Tools; Documentation; Emergency Management, Principles of; Emergency Management System; Fink's Crisis Life Cycle; Groupthink; Panic, Nature and Conditions of; Paradigm Blindness.

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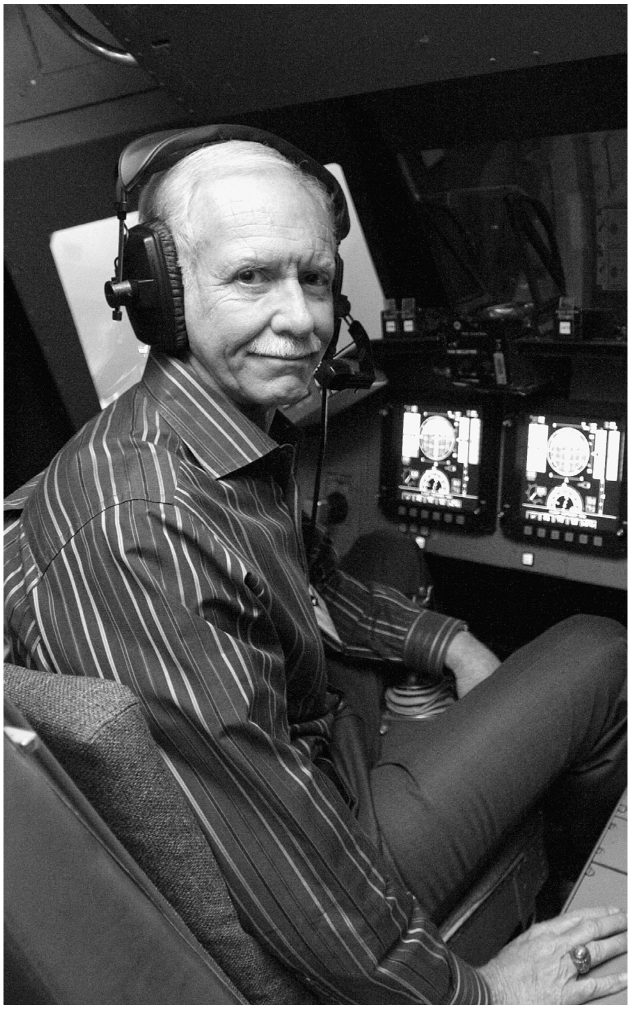
Decision Making Under Stress

Stress is one of the key factors that underlie the demands on decision makers when faced with crises. Whether the individual is an airline pilot; the manager of a nuclear plant; a police, fire, or naval commander; or an emergency or business continuity manager, crises are likely to result in decision makers dealing with an enormous number of variables, often in very short time frames.

Decisions are judgments or choices between two or more alternatives and include the period from the resolution of a problem to the implementation of a course of action. There are two comments to be made about this definition. First, one of those choices might be to do nothing, but it must be a positive decision to do nothing and not an abdication of responsibility. Second, in a crisis, there is no point in solving problems by making decisions if part of the process does not include the implementation of those decisions. Stress is the ordinary reaction of normal people to events that, for them, are unusual or abnormal. Invariably, decision makers will undergo some stress when dealing with crises. Increased stress can be both positive and negative. In some cases, it has been found to improve performance in that it makes people more alert and gives them an ability to think and act quicker; in other cases, heightened stress levels result in diminished performance.

Literature

Most of the literature on decision making is of little use to those who are required to respond to crises because it deals with the making of decisions in the normal progression of organizations. However, the most capable managers running organizations on a day-to-day basis are not necessarily those who will stand up best to the stress of managing crises. For instance, up until 1987, offshore installation managers—those in charge of oil rigs—were selected purely on their ability to get oil and gas from underneath the sea bed. However, in the inquiry into the Piper Alpha oil rig disaster, following a fire and its collapse into the North Sea and resulting in the deaths of 167 people, Lord Cullen, the inquiry chairman, found that the offshore installation manager (OIM) "took no initiative in an attempt to save life" and suggested that "the death toll of those who died ... was substantially greater than it would have been if such an initiative had been taken." Now, before being appointed as an OIM, a candidate is required to undergo simulated emergencies. It is essential that those who will be required to make decisions either at the strategic, tactical, or operational level are identified as able well before any such event.



Captain Chesley Burnett "Sully" Sullenberger III visits the virtual motion simulator at NASA's Ames Research Center, Moffett Field, California, December 15, 2012. Sully is best known for his cool-headed landing of U.S. Airways Flight 1549 in the Hudson River on January 15, 2009, saving all 155 lives on board.

The impact of stress on decision making can be significant and yet it is an aspect of human behavior that has, arguably, only been explored in the United States since it was mentioned as a factor during a congressional hearing in 1988 following the shooting down of an Iranian Airbus by the USS *Vincennes*, killing all 290 people on board. As a result, the Office of Naval Research sponsored a research and development program, Tactical Decision Making Under Stress (TADMUS), the aim of which was to provide principles and guidelines to enhance team tactical decision making in complex environments. At about the same time in the United Kingdom, Rhona Flin, a professor of psychology at Aberdeen University in Scotland, led a team looking at decision making under stress following the Piper Alpha disaster.

Causes of Stress

The causes of stress are many and varied. Crises produce unfamiliar and dynamic events; thus, they are constantly changing. Invariably, during the early stages, the scene or location of a crisis is confusing because information may be in short supply; later, the amount of information may be too much for the decision makers to absorb without support. Communication systems may have been destroyed or become inoperative. Resources may be in short supply or be inappropriate, and it may be necessary to coordinate the activities of numerous specialists, each of whom may have different vested interests. People may be seriously injured, even dead. There may be environmental factors such as the weather or the inaccessibility of the scene of the crisis.

The location of the decision makers may place them under additional stress if they themselves are in danger. A host of other people and groups are likely to put pressure on the decision makers, for example, senior management, who are concerned with the impact that the crisis will have overall on the organization; those below, who will be waiting for a decision to be made that decision makers may be incapable of making at that precise time because of a lack of information; the media, who have deadlines to meet; and the community, who are desperate to know how long the crisis will last and will it occur again. Finally, there is the time pressure. Time moves on, and this, in itself, puts pressure on decision makers, particularly if lives are at stake. All these place pressure on an individual's decision-making process.

Impact of Stress on Decision Making

A lack of training and a lack of experience coupled with a lack of ability or initiative leads to a lack of confidence and a fear of failure, thus placing decision makers under even more stress in already stressful situations. But it can also lead to a number of other negative aspects or defects in the decision-making process. For instance, tunnel vision or task fixation occurs because of a lack of knowledge of the type of crisis that has arisen; consequently, decision makers focus on what they know rather than on the wider picture. Alternatively, decision makers tend to focus on insignificant things that are, in relation to the actual crisis, often minor in terms of bringing the crisis under control. Because they are relatively immediate, decision makers may concentrate on short-term gains when under stress without thinking through the long-term implications. Alternatively, faced with serious crises arising from something they have done previously, or something they should have done that has been overlooked, the enormity of the situation suddenly hits them, and the resultant stress can cause them to "freeze." Acute perseverance occurs particularly when decision makers stand by a decision already made because they believe that changing it is a sign of weakness, even if all the information coming to hand suggests that a change of direction is necessary. Finally, there is mental and physical fatigue; after about 12 hours of intense concentration in complex crisis situations, the ability to make rational decisions begins to deteriorate, even in the fittest of decision makers.

Reducing the Impact of Stress

The ability of decision makers to cope with stress is dependent on a number of key factors that reduce the chances of their being affected by negative stress:

- The knowledge that they have of the area in which they are required to make decisions.
- Their experience in similar situations.
- The training they have undergone, including taking part in exercises, to prepare them for making decisions in stressful situations. In order to minimize the effects of stress on decision makers, pre-event training is essential but, although it is impossible to re-create reality in its entirety, that training must be as realistic as possible.
- The crisis response procedures that exist within their organization.
- Active support from their colleagues.
- Their ability to quickly adapt to varying demands.

- Their fitness, both physical and mental.
- Their temperament and suitability to be in the position of handling stressful events.

There are numerous examples of military commanders making decisions under stress but few from civilian crises. Some of the best examples of the latter are to be found in aviation. William Langewiesche's description of how, following an almost complete engine failure, Captain Chesley Sullenberger was able to land his plane, carrying 155 on board, on the Hudson River on January 15, 2009, is one of the most recent. In undertaking this operation, Sullenberger was, claims Langewiesche, "capable of exceptional mental focus," suggesting that "during the glide to the Hudson" he had been able to "ruthlessly shed distractions, including his own fear of death." It is worth pointing out, perhaps, that airline pilots are regularly given the opportunity to react to simulated emergencies.

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See Also: Command and Control; Coordination; Coping Capacity and Response Capability; Credibility; Decision Making; Decision Making, Theories of; Decision Stream; Decision Support Tools; Interoperability; National Incident Management System (NIMS); Simulations.

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Decision Stream

Decision streams utilize numerous components of business intelligence to aid business leaders and decision makers in analyzing data and ultimately making better operational decisions. The principles and practice of using decision streams adds a dynamic component to processes in crisis management that have been historically static. For crisis managers, decision streams' greatest benefit is the integration of decision support, decision evaluation, and impact analysis to determine the full and total implications of every crisis and associated actions. The use of streams is unique because users are able to quantify data previously in a qualitative format and attach a fiscal component to actions previously perceived to be nonfiscal in nature.

Decision Evaluation

Crisis managers using business or operational intelligence tools to evaluate decisions and action interactions are presented with graphical and textual outputs through tools such as Sync Matrix and similar systems. Sync Matrix was originally pioneered by Argonne National Laboratory, in support of the Federal Emergency Management Agency (FEMA) and the Department of Defense (DoD), to evaluate several complex emergency response programs, most notably the Chemical Stockpile Emergency Preparedness Program. Tools, such as Sync Matrix, allow crisis managers to view the complex interactions between decisions, actions, and reactions from the operational environment in a variety of graphical and data forms. These outputs then drive a data-based after-action or performance review process that has historically been qualitative in nature. The data-based reviews also assist crisis managers with the process of separating perceived gaps in performance from actual gaps in performance. Furthermore, when decisions are charted in real time and compared with predetermined benchmarks, crisis managers have the ability to trend responses and actions over a period of years. Multiyear trending allows managers to separate effective and ineffective initiatives over a prolonged period of performance.

Integrated Data Flow

Data generated during a crisis and reviewed following a crisis response can also be channeled

Case Study: Decision Stream at the University of North Carolina Health Care System

In 2006, the University of North Carolina health care system started aggregating and trending threat data through a database with the intention of utilizing decision streams as a decision support and planning tool. In 2011, following the collection of five years of data, response benchmarks and profiles were compiled for six categories of frequently occurring emergencies. These profiles measured and benchmarked the following components: (1) productivity loss during emergency response; (2) time lapse between warning receipts and message dissemination; (3) time spent conducting pre-planning, response, and recovery operations; and (4) loss of revenue/increase in expenses during the crisis.

Starting in 2012, all emergency responses and actions that fall into an established hazard profile are evaluated against the benchmarks listed for each of the four components listed above. Each component features an established range, with the expectation that a particular action or metric will fall within the acceptable range. Any and all outlying actions and/or metrics are subjected to after-action review and, if necessary, a root cause analysis.

Emergency response and actions falling outside the established categories are archived. Once five related responses are achieved and validated, a new profile is established. As of 2012, this new integrated system has resulted in around a $55,000 reduction in lost productivity by benchmarking emergency response teams for response time and alert activation accuracy. In 2014, the Office of Emergency Management and Business Continuity Planning intends to add four additional benchmarked components to all active and future profiles.

back into an integrated hazard vulnerability analysis (HVA) and associated business impact analysis components to challenge current ratings or profiles for specific hazards or threats. Although a single outlying data set is not sufficient to change all planning assumptions, it does, however, provide a point of reference for a response outside the assumed norm. These points of reference, over time, can be used to establish outer edges, or sigmas, of a response or action curve. In the case of crisis management and emergency response, these points represent the best- and worst-case scenarios. Periodic evaluations and statistical analysis are required of data sets to ensure the data inside these sigmas remain statistically significant and valid. As the results of an integrated HVA start to ebb and flow, so does the decision stream for certain hazards or risks. As a particular hazard increases or decreases in threat or impact, crisis managers can adjust the benchmarks accordingly.

Market Share and Fiscal Reductions

Businesses across multiple sectors have long used decision streams and other business intelligence tools, coupled with lean/six sigma principles, to streamline processes and reduce expenses. Although crisis management is not a “revenue-generating” discipline, crisis managers can contribute directly to cost savings and expense management. Integrated decision evaluations and HVAs can dramatically increase efficacy of continuity of operations as well as business continuity plans. If normal operations can be sustained longer and/or resumed more quickly, this will directly correlate with expense reductions and revenue stabilization.

Every action taken during a crisis has the opportunity to have fiscal impact, even those involving preservation of life safety. By using decision streams and business impact data derived from HVAs, crisis managers can know in advance what the potential impacts of a hazard are before it occurs. This allows the crisis manager to propose a solution or countermeasure. The rationale follows the same thread of a business unit requesting funding for a project that could increase revenue. In this case, the crisis manager is requesting funding for resources to preserve the revenue and/or market share already in place. The latter is especially true in service-oriented sectors, including health care, leisure and hospitality, and telecommunications. If customers are not being served by their primary provider choice for a prolonged period of time, they will find a new service provider.

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See Also: Business Continuity Management; Business Continuity Planning; Business Impact Analysis; Business Resumption Planning; Hazard Vulnerability Analysis; Impact Analysis; Losses, Quantitative Versus Qualitative; Risk Analysis.

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Decision Support Tools

A decision support tool (DST) is a tool that assists in decision making rather than making a decision for the user. The tool can provide guidance and analytical or procedural information to help users make optimal decisions. The tool can be a written document providing guidance or a computer technology–based tool comprising written documents, a number of functionalities, and wizards to aid in the decision-making process. A computer-based tool, also known as a decision support system (DSS), is a system designed in the framework of intelligence (helps resolve a problem), design (allows development of alternative solutions to a problem), and choice (helps analyze the impacts of alternatives to determine the best decision).

The development of computer-based DSTs started in the 1970s in the DOS and UNIX platforms, which moved to the Windows platform in the 1990s. The majority of the initial versions of these tools were stand-alone software designed for a single user at any given time. The growth and research advancements made in networking (World Wide Web, the Internet, and telecommunication technologies), computing (processing speed, hardware memory, and graphic visualization), information sharing (availability of digital data), and programming have allowed development of DSTs that are knowledge based, implement artificial intelligence, and allow access to multiple users at once.

Advantages and Limitations

Though advancements in information technology in the 21st century have increased the popularity and development of computer technology–based tools, these tools still are riddled with limitations. The merits of these tools include the following:

- *Efficiency:* The tools allow better understanding of a problem and impacts of potential solutions, thereby resulting in faster decision making and time saving.
- *Effective:* Because of availability of information regarding problems, DSTs enable improved decision making and better decisions.
- *Participatory:* Because data and other ancillary information are readily available, the tools enhance communication and collaboration among participants.
- *Cost savings:* Because a group of users can use the same tool, DSTs reduce costs for labor and for technology and infrastructure purchase.
- *Satisfaction:* The tools assist in determining adverse impacts of different solutions to a problem. It is, therefore, possible to choose a decision satisfactory to decision makers.
- *Accessibility:* Use of the Internet/World Wide Web has increased accessibility of a DST to any individual interested in the decision-making process. These tools eliminate the influence of demographic/income/ethnic/cultural diversity of decision makers on decisions.
- *Promote learning:* Use of these tools and constant updating of information help

decision makers learn new concepts and better understand the relationship between a problem and potential solutions.

- *Increase organizational control:* By storing all information shared by decision makers about a problem, these tools work as a warehouse of information. Thus, they allow managers responsible for problem solving to choose the best solutions based on participant information.

The limitations of these tools include:

- *Overemphasize decision making:* Although DSTs support decision making, the success of a decision is influenced by social/political/cultural characteristics of the problem-managing organization. Hence, managers should decide the appropriateness of using these tools with regard to a problem.
- *Relevant information:* Because the information is public, citizens tend to believe in the relevancy of information. It is, therefore, imperative to check and update relevancy and accuracy of data and information.
- *Unanticipated effects:* Information availability is crucial for successful use of these tools. The amount of information available can influence users' final decision, thereby leading to chaotic decisions and other such effects.
- *Obscuring responsibility:* Decision makers rely on available data/information to make appropriate decisions. Decision makers may blame the tool for their actions rather than assuming responsibility. Decision makers and managers should understand the role of the tool in decision making, and developers must also understand the problem and provide relevant information.
- *Objectivity:* The tool can be used to rationalize certain decisions that might not be acceptable to the broader community. Hence, managers responsible for final deployment of a decision should account for this problem.
- *Status reduction:* Managers may argue that the tool can diminish their status in the overall organizational structure, thereby resulting in lack of reliability in the tool. Developers and users of these tools need to resolve the status issue.
- *Information overload:* DSTs can manage and reduce information load on a user. Developers and managers of these tools need to monitor user perception and provide adequate information to make a suitable decision.

Components of a DST

A DST comprises four main components: (1) a user interface allowing user interaction with the tool, and graphic functions to visualize outcomes and reporting tools; (2) an interactive database management system to access different sources of data, information, and knowledge; (3) a model-based management system comprising models and analytical tools and functions to analyze and interpret data to help in making decisions; and (4) the network and architecture of the tool that assists its deployment on a network for user-group access. A DST can also be classified based on its input (problems that need to be analyzed, associated data/information), user expertise (required expertise and knowledge of users to solve problems and analyze information), output (the final information that will be used in formatting user decisions), and result (the final decision made based on user inputs).

Future Trends

Successful deployment of each component and their interactions with each other is vital for the success of a decision support tool as well as for an organization's operation and technical decisions. These tools also need to be technically and economically feasible for use; must contain legal, regulated, and detailed information appropriate for the problem; and have information adequate to help users successfully make a decision. Hence, a DST must aid a variety of stakeholders to make usable decisions based on available information. Following are some of the issues that influence acceptability and adaptability of these tools and require further research:

- *Privacy/confidentiality:* Because participants share their personal information, protecting privacy of participants and maintaining confidentiality of user information will allow citizens to feel secure in using these tools.

- *Integrity:* The tools should be accessible, reliable, timely, and transparent, and they should meet expectations of citizens so that future participation can be encouraged.
- *Accountability/nonrepudiation:* To ensure interaction and participation of users in the decision-making process, it is required that providers and recipients of information are accountable for using and providing information.
- *Trust:* Increasing user trust will increase acceptability and usage of these tools. This can be accomplished by verifying information quality, accuracy, and relevancy, and by taking measures to protect IT infrastructure from failure. Though digital data availability has enabled providing updated information at a faster pace, these data are not always available publicly or are expensive to obtain and maintain. Attempts should be made to provide cheaper accurate and updated information.
- *Knowledge representation:* Data and information can be represented by different visualization techniques. The kind of information each technique depicts can influence the decision-making process. Exclusion of user knowledge or the assumption that the user is knowledgeable about a problem can influence eventual decisions. Understanding user knowledge and need is essential to design tools.
- *Sustainability:* Updating these tools and information is imperative. However, cost of hardware, software, and data can influence the sustainability of a tool.
- *Interactivity:* Tools should be interactive, which means they should allow transaction of information.
- *Scale:* Although each user's decision is crucial, an individual's decision might be different from that of a group of participants. It is, hence, required to decide the scale at which a decision should be made for effective and satisfactory decision making.

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See Also: Coordination; Crisis Communications; Data Mirroring; Decision Making; Decision Making, Theories of; Early Warning Systems; Social Media.

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Dedicated Site

To effectively manage a crisis, key people must all know where to meet to gather pertinent trustworthy information, exchange ideas, and authorize organized actions in response to a crisis. A dedicated site equipped specifically to manage crisis will help accomplish effective crisis management, saving time, money, reputation, and even lives.

Organized Response

Without an organized response, a crisis will evolve through the disorganized activities of the people involved, which may have adverse impact on the people and organizations assumed to have responsibility and accountability for the results of the crisis. Effective crisis management can control and direct the evolution of a crisis. To do so, the organization with responsibility needs to bring key people together to understand the crisis and direct actions in response.

The velocity at which a crisis unravels and information and misinformation travels requires an equally speedy crisis management process that can be achieved only by having key people in close proximity for communication and discussion before authorizing actions that control and direct the evolution of a chaotic incident into an event with an organized response.

Characteristics of a Dedicated Site

A dedicated crisis management site must have the following characteristics: (1) It must be accessible under all weather conditions and circumstances because key people must be able to travel to the site; (2) the location must be communicated regularly to all key people; (3) it must be secure from unauthorized access both physically and technically (such as a cyber attack); (4) it must be equipped with many forms of communication; (5) it must be insulated from the most common threats so it is not involved in the crisis; and (6) to assist with maintaining its usefulness, the site must be exercised regularly using crisis management drills that also offer the advantage of training key people to use the crisis management process effectively at the site. It is also advisable to have at least one alternate site in case the primary site is disabled by the crisis.

Important capabilities of a dedicated crisis management site are multiple inbound ways to gather information about the crisis and multiple ways for outbound communication to help authorize response actions that control and direct the evolution of the crisis. Following are important inbound and outbound capabilities.

Runners are people whose purpose it is to run information and physical objects to and from the site—information as in commands to take actions, maps, pictures, and verbal information relays; and objects such as additional radios or cell phones or paper purchase orders for extra supplies. Most often, the site will be well removed from the crisis, so running can be internally within the site; however, if technology is unavailable, the runner may be the only real alternative.

Television and radio bring outside news of the crisis and can help determine the direction of the public's perception regarding the crisis. They can also help the team prepare public information statements to the press and public to explain the team's strategy and belay any fears about how the crisis is being handled.

Internet access can provide ways to monitor information from popular social networking Web sites and to receive e-mails from many sources containing information and even pictures and videos. The Internet can also be used for outbound communication to the public as well as to vendors and outside team members who are hands-on in direct response to the crisis. With the speed of Internet communications and the ability to lose control of the delivery of confidential communications, the Internet should not be used for confidential communications. Internet access should also be secure from cyber attacks through the use of firewalls that prevent unauthorized access. Inbound e-mails should be scanned for threats that could incapacitate the site's ability to communicate using the Internet.

Multiple methods for inbound and outbound phone calls help facilitate verbal communication between an organization's staff, concerned public, the press, and local government. Phones tend to be the most used form of communication, but at times they can be affected by the crisis and should not be the only form of communication available. It's helpful to separate inbound calls from outbound calls to prevent one single phone or set of phones from being made useless by excessive traffic. Phone communications should include both wired phones and cell phones, and can even include satellite phones. Every type of phone has limitations and the potential to be affected by the crisis, so the more means of communication a crisis management site has, the better chance it will have to fulfill its purpose.

Monitoring amateur radio can bring more information because it is used by government first responders to address public safety. In fact, most crisis management sites are also called emergency operations centers (EOCs); even though their purpose is slightly different, their form and functionality can be almost identical. If the site will also communicate with local government, it should have amateur radio capabilities.

Fax machines are also useful for communication, mainly outbound. Many news services and vendors will accept faxes to report on crisis activities and purchase supplies needed during the crisis. There are also fax services on the Internet and fax servers with the ability to both handle large volumes of fax communication and store the faxes for future reference.

Some computer applications can also help organize and document crisis handling to be used for verification of completed actions and also as future legal proof of whether certain activities were ordered at the proper time. These applications can be used from the Internet or can be located on servers in the crisis management site. Great care should be taken when obtaining an application, as it may be affected by the crisis.

Every dedicated crisis management site must have the capability of serving the people using it for the longest period of time it may be required. If people will be using the site for weeks or months, their creature comforts must be addressed in design and construction of the dedicated site's capabilities. Sleep areas, food/drink, kitchens, bathing facilities, health care, and other needs should all be considered before a dedicated site is deemed worthwhile.

The final and perhaps most important characteristic is that a dedicated site for crisis management should be as immune as possible to the things that would cause a crisis. Uninterruptable power supplies (large batteries) and generators as well as a fortified structure can help a dedicated site survive the crisis and be available for the crisis management team.

Conclusion

A properly equipped and utilized dedicated crisis management site can be a very effective tool allowing an organization to control the evolution of a crisis to limit risk and save time, money, reputation, and even lives.

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See Also: Command and Control; Emergency Management Agencies, City and County; Emergency Operations Center; Emergency Support Functions; Federal Emergency Management Agency (FEMA); Fusion Center; Incident Action Plans; Incident Management; Incidents Versus Crises; State Emergency Management Agencies.

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Deforestation

Forests are generally defined by the amount of tree canopy cover; deforestation is removal of tree cover. Deforestation is the practice of removing tree cover and converting covered forested lands to nonforest uses, resulting in the permanent destruction of the forest. Deforestation accounted for an annual loss of 16 million hectares (39 million acres) of forest through the 1990s and dropped to 13 million hectares (32 million acres) annually in the first decade of the 21st century.

The Southern Hemisphere accounts for the majority of forest loss, with South America (4 million hectares [8.9 million acres]) and Africa (3.4 million hectares [8.4 million acres]) accounting for a little over half of global forest canopy loss. Forest utilization in the less-developed countries is a result of rapid urbanization, population growth, and economic demands for forest products. European forests have continued to expand, while those in North and Central America have remained stable. Australia has been losing forest since 2000 as a result of considerable drought-related issues and forest fires. The tropical areas are being deforested at a faster rate than other areas globally. For example, from 2000 to 2005, deforestation in tropical areas increased by 8.5 percent compared to the 1990s. During the same time, the loss of old-growth forest in Nigeria and Vietnam doubled, and it tripled in Peru. The largest forest in the world is the Amazon rainforest, covering 550 million hectares (1.3 billion acres). Sixty percent of the Amazon rainforest is located in Brazil, and the remaining 40 percent is located in the countries of Bolivia, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela. Over the past 40 years, Brazil has deforested 60 million hectares (148 million acres) of the Amazon, primarily for cattle ranching (more than 60 percent) and subsistence farming (30 percent). As a comparison, the United States has deforested 215,228 hectares (531,840 acres).

Globally, the reasons for deforestation include agriculture production (i.e., fruit tree [banana], soybean, and palm oil plantations), clear-cutting (e.g., for pulpwood and charcoal), mining (e.g., open pit and large scale), the creation of livestock pastureland, human settlements, and infrastructural projects (dams, road systems). The most common reasons for converting deforestated land globally are subsistence farming (46 percent), commercial agriculture (32 percent), logging (14 percent), and for fuel products (5 percent), according to the United Nations Framework Convention on Climate Change (UNFCCC).

Effects

Deforestation results in soil degradation, water cycle disruption, loss of biodiversity, increased flooding and drought, and increases in carbon dioxide (CO_2) in the atmosphere. The removal of forest cover and vegetation exposes the soil to direct sunlight, resulting in drought conditions, and the nutrient-rich topsoil is lost to wind and runoff erosion, increasing sedimentation in streams, rivers, and wetlands, thus preventing future forest regeneration because of soil degradation. Ultimately, the severity of the topsoil

A peat forest in Indragiri Hulu, Riau Province, Indonesia, is deforested to make way for an oil palm plantation, a highly lucrative venture and one in which Indonesia is now the leading supplier. According to the WorldWatch Institute, deforestation of peat bogs and native tropical forests to plant oil palm plantations creates numerous crises, such as species endangerment, the uprooting of local communities, and the release of methane gases that contribute to global warming.

degradation results in its being unworkable, and the land becomes a barren wasteland.

The water cycle is significantly disrupted by deforestation. The process of transpiration is disrupted by the loss of trees and vegetation. Transpiration is the process of trees and plants drawing up groundwater, commonly with their roots, then releasing the water (evaporation) into the atmosphere via pores in their leaves. Over half of the water in the Amazon rainforest is circulating inside the trees and plants. Trees also absorb precipitation and runoff, thus preventing topsoil erosion. The loss of trees increases soil erosion and diminishes the replenishing of the water table. Trees also absorb heavy precipitation, and without trees, the unabated runoff can result in floods. Ultimately, the loss of water cycle results in the land becoming a barren wasteland as well as the surrounding area becoming susceptible to flooding.

The loss of trees, vegetation, topsoil, and the water cycle results in significant biodiversity loss. This is particularly acute in tropical regions, which harbor almost half of the Earth's species but account for less than 10 percent of the dry land. The tropical animal and plant species are very diverse and highly specialized to specific microhabitats and ecosystems. Deforestation in these highly specialized microhabitats can result in specific animal and plant species becoming threatened and even extinct.

Forests are like the lungs of the Earth, because they absorb and store carbon dioxide from the atmosphere (a biological process called biosequestration), which is converted to nutrients for the tree. When the tree dies and rots, is cut down, or is burned, the stored carbon is released as CO_2 back into the environment. Trees lost to deforestation result in more CO_2 being released in a small time window than trees dying naturally. Deforestation is estimated to be contributing to between 20 and 30 percent of the total of human-caused (anthropogenic) CO_2 emissions. These carbon emissions are a major contributor to climate change.

Conflict in the Forest

There are some positive and negative socioeconomic results from deforestation. On the positive side, deforestation can be viewed as making positive changes to the rural and remote forest people. The benefits are building communities, colonizing regions, and providing an economic base for impoverished areas. Harvesting of the forest allows for economic growth as well as the lumber for building homes, buildings, and factories. Roads and bridges are pushed through, which open areas for trade and provide transport routes, allowing new products in rural and remote areas. Small-scale farms can supply agricultural products to other regions and provide locals with a modest income.

These same perceived benefits have also created friction. First, economic and development decisions do not significantly include the indigenous people most affected by the plans. Next, not all areas are interested in the changes, and some groups view the changes as destroying their way of life. As a result, deforestation creates conflict (sometimes violent) between the local indigenous people and those modernizing under governmental approval. The conflict is also over ancestral rights and governmental rights, as the encroachment onto indigenous lands is seen as ignoring the rights and removing the livelihood of the indigenous people. Millions of indigenous people already make their living from the tropical forest through subsistence (hunting and gathering) and/or harvesting forest products. The challenge to governments is balancing forest use/conservation, economic development, and needs of indigenous people.

Reforestation

One solution to buffering the effects of deforestation is reforestation. Reforestation is beneficial to humans and ecosystems because it enables the capture and storing of carbon dioxide. Planting trees is critical in reducing the effects of deforestation because trees prevent flooding and erosion, reduce topsoil loss, and prevent increased sedimentation in streams, rivers, and wetlands. Reforestation benefits water bodies as well through aquifer recharge, storage, and recovery, and recycling inland rainfall. Tree planting and maintaining topsoil are essential for rebuilding natural habitats for plants and wildlife.

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See Also: Avalanches and Landslides; Climate Change Adaptation; Floods; Global Warming; Poverty; Resource Collapse; Resource Management; Wildfire.

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Denial-of-Service Attack

A denial-of-service (DoS) attack is a cyber attack intended to deprive users of a resource or service that they normally expect to have. Specifically, it is an attempt to render a computer or network inaccessible to its intended users by suspending the communications of networked computers to the Internet. The term is sometimes used interchangeably with distributed denial-of-service attack (DDoS attack) because this is the most common form of DoS attack, though they can take other forms. DDoS attacks come from multiple computers and systems, meaning that they are much more complex than simple DoS attacks and also much harder to protect against. DoS attacks constitute a significant threat to the operational functioning of any organization dependent on the Internet for a significant part of its operations. They can create significant functional crises that not only threaten the organization itself but also can have implications for public safety, as Internet-based systems can now be considered to be part of the critical infrastructure of society. They therefore require explicit consideration within crisis management plans. They may be conducted by terrorists, by criminals, or just for maliciously mischievous purposes.

Generally, DoS attacks do one of three things: they force the target to reset continually, they block communications between the target and its intended users, or they consume its resources to the extent where it can no longer appropriately respond to legitimate traffic. Bombarding the target with external communication requests is a particularly common form of attack. The target becomes saturated with these requests to the point where it is incapable of responding to any other form of traffic or it becomes so slow in responding that it is ineffectual for legitimate business. When DoS attacks are targeted at a network, every computer within the network is affected by the attack and experiences detrimental effects in functioning.

Ethics and Legality

DoS attacks have been specifically considered by organizations that provide and police Internet services and have been deemed to be unethical practices. The Internet Society's policy statement issued through its Internet Architecture Board explicitly states that disrupting the intended use of the Internet and wasting resources through such actions is both unethical and unacceptable. In addition, Internet service providers issue acceptable use policies that govern and restrict the ways their services can be used. DoS attacks violate virtually all such policies. In addition to being considered ethical violations, DoS attacks are often illegal according to the laws of individual nation-states. For example, in the United States, these are a serious federal crime carrying lengthy imprisonment penalties, and in the United Kingdom, DoS attacks these have been illegal since 2006, carrying a maximum penalty of 10 years imprisonment. Other countries have similar legislation and punishments.

Prevention and Motivations

Intrusion detection systems are likely to be of little use, as DoS attacks rarely hide themselves and are intended to be visible and obvious disruptions. DoS attacks exploit normal traffic routes, meaning that it is not an option to close routes in order to prevent attack. Prevention of DoS attacks generally relies on a combination of tools to detect attack, to classify traffic, and to respond appropriately. Ultimately, the aim is to block illegitimate traffic but still allow legitimate traffic. This is not straightforward, however, as the illegitimate traffic often closely resembles the legitimate, deliberately spoofing this. This means that many protection systems, such as firewalls, cannot differentiate between them. Attacks that exploit systems' vulnerabilities may be avoidable to a certain extent, but attacks that flood systems with communications are much harder to resist. There is a range of tools available for purchase that assist in defending against DoS attacks, and some of these have successfully prevented attacks in the past. Where operations depend on continuous Internet availability, there is a definite danger of DoS attacks, but vigilance and forward planning can still prevent attacks from becoming serious crises.

The motivations for DoS attacks are various. There may be ideological or political motivations, or vigilantism, or attacks may be used by states or governments as a form of censorship. There may also be less ideological motivations, such as extortion, where a business is asked to pay a "fee" to prevent DoS attacks by the extorter. It has also been suggested that DoS attacks could be used as a form of stock manipulation or to put competitors out of business; however, there is less obvious evidence that this is occurring.

Examples

Perhaps the clearest example of the problems that DoS attacks can create is the attack in 2010 that took the entire country of Myanmar (Burma) offline. The attack happened as Myanmar was holding its first election in 20 years. The ruling military claimed that the election heralded the transition to a democratic state, but there were doubts, both within Myanmar and internationally, as to whether this would be a sham. International observers and foreign journalists were not allowed into Myanmar to cover the election, which made the Internet vitally important as a communication tool to monitor events. This was not the first time that Myanmar had gone off-line; in 2007 the government allegedly severed the country's Internet links as a response to growing political unrest.

In 2011, following the posting online of a "recruitment" video, rumors began circulating that Anonymous (a decentralized anonymous online community that takes coordinated action toward self-agreed goals) was to attack the social networking site Facebook. These rumors resurfaced in 2012, shortly before Facebook's initial public offering in the stock market. Anonymous denied the rumors, and no such attacks appear to have occurred. However, Anonymous has claimed responsibility for a number of high-profile DoS attacks. These include a number against the International Federation of the Phonographic Industry, as a pro-piracy stance, as well as an attack against a child pornography site called Lolita City, intended to take the Web site off-line, an example of a DoS attack being used for vigilantism.

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See Also: Business Continuity Planning; Critical Infrastructure; Cyber Crime; Cyber Security.

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Department of Homeland Security (DHS)

The Department of Homeland Security (DHS) is a department of the United States' federal government, developed from the National Strategy for Homeland Security that emerged in the aftermath of the terrorist attacks on September 11, 2001. The organization saw several evaluations and modifications in 2005, 2006, 2007, 2009, and 2010. The department was created by integrating all or parts of 22 existing federal agencies and departments. DHS has five key roles in addition to efforts to strengthen the department itself: (1) preventing terrorism and enhancing security, (2) securing and managing U.S. borders, (3) enforcing and administering immigration laws, (4) safeguarding and security of cyberspace, and (5) ensuring resilience to disasters. Each of these roles centers on domestic safety and security and includes and influences crisis management efforts.

Organization

DHS is run by the Secretary of Homeland Security, a position in the president's cabinet and part of the presidential line of succession after the Secretary of Veterans' Affairs. After the inclusion of many preexisting agencies and the development of the new department, DHS has grown to be the third-largest American cabinet department after the Departments of Defense and Veterans' Affairs, with over 200,000 individuals. The department is part of the United States Homeland Security Council (HSC), along with the departments of Treasury, Defense, Health and Human Services, and Transportation, as well as the Federal Emergency Management Agency (FEMA) and the Federal Bureau of Investigation (FBI).

Many of the agencies and departments that became part of the Department of Homeland Security had previously played a role in crisis, emergency, and disaster management. The groups that merged into DHS included, among others, the Office for Domestic Preparedness, FEMA, the Strategic National Stockpile, the National Disaster Medical System, the Nuclear Incident Response Team, Domestic Emergency Response Teams, the National Communications System, and the Transportation Security Administration. As various agencies and departments became part of the new department, many were reorganized into newly created groups or became part of other, often larger, organizations within DHS. For example, the responsibilities of the Office for Domestic Preparedness, previously part of the Justice Department, now became part of FEMA, which was, in turn, now part of DHS.

Crisis Management and Other Operations

DHS is involved in many levels of crisis management. According to the Department of Homeland Security Act of 2002, DHS is responsible for giving crisis management support to local, state, and private entities that take part in information, analysis, or warning systems. This support often emerges after threats to or attacks on those systems.

Through DHS-related laws and presidential directives, as well as the National Strategy for Homeland Security, several new policies have emerged related to the operation of DHS and other federal agencies and crisis preparedness and management. Homeland Security Presidential Directive-5 required federal departments and agencies to adopt the National Incident Management System (NIMS). Following from NIMS, the National Response Plan (NRP) was created in 2004 and replaced in 2008 with the National Response Framework (NRF). The NRF Resource Center falls under the purview of the Secretary of Homeland Security, the head of DHS. As an incident-management system, NIMS includes efforts to prevent, prepare for, respond to, and recover from a wide range of crises, emergencies, and disasters. These management efforts include not only helping other organizations in their efforts but also ensuring that various groups can work together effectively.

Problems

When DHS was formed, complaints quickly emerged about the potential problems of combining a vast range of operations and agencies within one parent department. For some critics, the primary problem was the diverse nature of duties that the agency would now support. For others, the department's creation was seen as a political maneuver to allow the government to point to changes being made and less of an actual fix for problems of communication, prevention, and response that seem to have emerged with the September 11 terrorist attacks. Critics who ascribed to both of these ideas reemerged in the wake of Hurricane Katrina and its effects on New Orleans, Louisiana, and the rest of the U.S. Gulf Coast. Some argued that the problems with federal and other government responses to Katrina demonstrated the flaws of having a large agency responsible for too many things, demonstrating that DHS was being stretched too thin. Others claimed that the problems with the Katrina response revealed that the creation of DHS had not solved preexisting government agencies' troubles with crisis, emergency, and disaster prevention, preparedness, response, and recovery.

DHS has also been charged with several accusations of waste, mismanagement, and ineffectiveness. After Katrina, a Government Accountability Office (GAO) report found widespread waste and fraud totaling over $2 billion. The report and its findings were widely covered in American media, presenting the general results and specific examples of financial mismanagement to the public. Investigations by the media also revealed other problems, including the incorrect use of the data mining tool ADVISE (Analysis, Dissemination, Visualization, Insight and Semantic Enhancement).

Conclusion

DHS emerged as a transformation of crisis management efforts in the aftermath of September 11, 2001. The department was formed to include a wide variety of smaller government offices and agencies in an effort to create a more comprehensive crisis, and incident-management system. However, concerns have emerged as other disasters, crises, and emergencies have revealed problems, leading to attempts to change DHS's organization and duties to make it more effective.

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See Also: Civil Protection; Cyber Security; Federal Emergency Management Agency (FEMA); Immigration; Terrorism.

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Disaster, Definition of

Disasters are caused by hazards (natural, human-made, or some combination of both) when they intersect with a vulnerable population, causing severe damage or destruction to people, resources, and the surrounding environment. To prepare for and respond to disasters, crisis management must identify potential threats to a group, which includes both considering the hazard that will prompt the disaster and the population it will affect—a wide range of factors. In addition to physical effects such as human deaths and injuries, and damage or destruction of human-made and natural landscapes, disasters may directly or indirectly impact social and political structures, causing economic problems and environmental destruction and loss of life.

Despite these general characteristics, many people and organizations offer various specific definitions of disasters. People often casually use the term *disaster* interchangeably with related terms like *catastrophe*, *crisis*, or *emergency*. Defining disasters is complicated by the wide range of events that can fall under the term that can be framed by their causes (such as natural hazards) and their effects (widespread devastation, large numbers of a population killed or left homeless).

The disaster itself is often considered to cover a set period of time marked by when a natural hazard's direct effects began and ended or between a human-made hazard's release and cleanup. However, the effects of a disaster and the recovery period after it can last beyond that time, concluding long after the disaster itself is considered to have ended. Moreover, social circumstances and

Homes in Henryville, Indiana, lay shattered five days after a series of tornadoes struck southern Indiana on March 2, 2012. Thirteen people died and hundreds were left homeless. President Barack Obama issued a major disaster declaration on March 9, two days after joint preliminary damage assessments were completed in six counties. By definition, a natural disaster is considered to cover a set period of time marked by when the hazard's direct effects begin and end, but the effects of a disaster and the recovery can last far beyond that.

human changes to the environment that can affect a disaster predate the direct effects of the hazard on a population. A disaster is not solely the product of the hazard involved but also emerges from the affected population.

Natural and Human-Made Disasters

Disasters are generally divided into two broad types: natural and human-made. Natural disasters involve a hazard produced by the environment, such as a hurricane, earthquake, or blizzard, for example, Hurricane Katrina in 2005. Comparatively faster-moving natural hazards like tornadoes or floods are generally classified as disasters, but slower-moving and longer-lasting hazards like droughts are not always referred to as disasters; however, some researchers challenge this and argue that, although slower to develop and progress, events like droughts should be considered natural disasters.

Human-made disasters emerge from agents produced by human beings, such as nuclear waste, oil products, or manufactured chemicals, such as the Bhopal gas leak in 1984. Although many human-made events are considered disasters, some are often excluded. Wars, for example, are rarely classified as disasters but instead are considered by their own terms. Still other events, such as terrorist attacks like that of September 11, are only sometimes classified as disasters, otherwise contextualized within a distinct category apart from disasters and events like wars. In some cases, one type of disaster can cause the other, further complicating the definition of a disaster, as was the case with the Tohoku earthquake and tsunami in 2011, which included the Fukushima

Daiichi nuclear disaster, when a natural disaster led to a human-made event.

Disasters may also be differentiated as sudden or rapid-onset or as slow-onset disasters, either type of which can be either natural or human-made. Sudden or rapid-onset disasters include relatively unpredictable and unexpected hazards like chemical spills or tornadoes. These rapid-onset disasters leave relatively little time to prepare or respond, often striking people while they are still unaware of the disaster's existence or progress. Slow-onset disasters include events that can be tracked over longer periods, such as hurricanes or famine. These disasters often give people more advance notice and time to prepare, but that time helps only if they have the resources to make appropriate preparations.

Increasingly since the 1970s, many experts and organizations, such as the Red Cross, view disasters as the intersection of a hazard and a vulnerable population. In this perception of disasters, "hazards" refer to events or processes that pose a potential risk to human populations. These hazards include naturally occurring events such as hurricanes or earthquakes and human-made events such as chemical spills. Vulnerable populations are those who are less able to prepare for and recover from a disaster, based on certain characteristics such as age, gender, or economic or social status. This vulnerability goes beyond simply being affected by a hazard and into a consideration of social and economic status, including factors like poverty, gender, race, age, and disability. Crisis management therefore must not only consider the physical effects of a disaster but also deal with a variety of populations that have different needs following a disaster.

Some argue that the distinction between natural and human-made disasters is not as important to how disasters are managed by officials or experienced by individuals or groups as is the speed with which they begin and happen or the scale of the disaster. This includes the idea that larger disasters (by scales such as the affected land area or population), whether natural or human-made, must be managed in a different way than smaller disasters because they result in the need for more resources to be used, more organizations involved in response and recovery, and often more long-term consideration to successfully manage the disasters and their effects. Within this framework, so-called natural disasters may be considered to have effects that are human-made (particularly when considering vulnerable populations).

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See Also: Disaster Recovery; Emergency, Definition of; Hazard, Definition of; Vulnerability; Vulnerable Populations.

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Disaster Assessment

Disaster assessment is an essential part and ongoing activity of any disaster or crisis. There is a misconception that disaster assessment is a one-time activity during disasters. Actually, disaster assessment is important during all phases of disasters to make an accurate assessment of the situation, needs, resources, and progress during and after the event.

What Is Disaster Assessment?

The concept of disaster assessment depends on understanding what a disaster is. A disaster is an extraordinary event whose consequences lie beyond the capabilities of the local community to respond. When consequences of a disaster exceed the ability of the community to contain them, there is a disaster. The community needs external help to control the situation.

Assessment is a critical activity and an essential component of disaster preparedness and management. In disasters, assessment usually includes but is not limited to situation assessment, needs assessment, available resources, and recommendations. Situation assessment describes the disaster and its impact on the community, the infrastructure, and the environment. Needs assessment determines needs of the affected community classified according to their urgency to the affected community. For example, in a disaster with many injured but with the infrastructure intact, urgent needs would be medical aid, but in another situation, shelter, food, and water may be more important.

The process of disaster assessment has five objectives:

- To determine the impact of the disaster on the community
- To determine the needs and their priorities to the affected community
- To determine the resources available
- To determine development or mitigation opportunities
- To monitor the recovery process

Who Will Perform the Assessment?

The assessment of any disaster is an important step for all the following actions needed in a disaster. External aid or funds usually depend largely on valid assessments indicating a real need for aid, the extent of this aid, and its urgency. Meanwhile, most disaster situations are characterized by urgency and disruption of regular organizational processes. Therefore, choosing the right team to do the assessment is a vital step toward response to any disaster.

There may be different teams assessing the same disaster. Every organization concerned with the disaster may have its own assessment team. For example, if a certain country is experiencing a disaster following a devastating earthquake, the country will have its own assessment teams assessing the situation and sending reports to all stakeholders. Humanitarian organizations, either international or national, will usually have their own assessment teams and will not depend solely on the data developed locally. The assessment team composition should reflect the type and the environment of the disaster. The team composition usually follows policies and guidelines of the organization carrying out the assessment. Appointing a team leader with expertise in the type of disaster under assessment is vital in flexibly responding to changing circumstances. Sometimes, help from the local community may be needed.

Format of the Assessment

The format of the assessment differs slightly between different organizations, according to the main mission and objectives of each organization or authority. For example, United Nations organizations conduct comprehensive assessments covering nearly every aspect of the disaster, whereas a volunteer medical organization focuses mainly on health issues, opportunities for preventing disease, and medical needs of the affected populations. However, most of the assessment elements are similar among different organizations. Elements of assessment usually include some or all the following items:

- Situation assessment
- General description of the situation and population affected
- Infrastructure damage
- Environment
- Shelter
- Food
- Water
- Sanitation
- Health
- Others (e.g., political situation, security, transportation)
- Needs assessment
- Immediate
- Long term
- Resources assessment
- Forecasting

Situation Assessment

The situation assessment should be as comprehensive as possible because any item missed during initial assessment may affect the following

Case Study: Assessment of the Marmara Earthquake, Turkey, 1999

The Marmara earthquake (7.4 on the Richter scale) hit northwestern Turkey on August 17, 1999, early in the morning. It was a major disaster that resulted in over 17,000 dead and some 32,000 injured.

The local government authorities and a multitude of international organizations responded to the event. The government of Turkey invited the World Bank to help in the disaster assessment. The World Bank had already sent two teams to the disaster location to assess the event. This was important to the Turkish government because it would help in assessing the damage and the forecasted funding needed to reconstruct from the damage. The two teams of the World Bank did not start their missions simultaneously. The Emergency Recovery team began its work first, on August 24, 1999, and its mission was to assess damage. The second team started their work on September 1, and its mission was to make an economic assessment. The reports of the two teams were synthesized after the end of the assessment on September 10, 1999.

The initial assessment of the teams resulted in realizing the great damage caused by the earthquake. The assessment also formed a good base on which the World Bank and local government could anticipate the funds needed for reconstruction and the sectors that sustained the most damage.

Although the assessment by the World Bank teams focused mainly on evaluating the cost of the damage, it was mandatory to assess the entire disaster from its different aspects. The assessment report did not include only costs representing how many buildings were damaged or how much money would be needed for reconstruction. The assessment included elements that need to be evaluated in any disaster to give an appropriate understanding of the disaster. It included estimated damage costs for housing, infrastructure, environment, roads, bridges, railways, education, health, and other elements.

Uncertainty and difficulty in getting data arose as a problem during assessment and preparation of the reports, although the assessment teams coordinated with the local government and made site visits to get information from the affected population themselves and to conduct a visual assessment of the damage.

The assessment teams stressed in their report that the numbers in the report were their best estimates and based on the data available at the time of assessment. They also stated that these numbers needed updating when new data became available.

This is a good lesson to learn in assessment. Because disasters are not static events, assessment also should not be a static configuration of the underlying disasters. Any disaster comes into successive phases, during which numbers may change dramatically. Therefore, monitoring and continuous assessment during all phases of any disaster is the best way to get a reasonable conceptualization of the baseline data and changes as they occur.

Although the main focus of the World Bank report was to assess damage cost, it was mandatory as a disaster assessment to include some details about other effects of the disaster on the community. The assessment report did this, dividing the impacts into sectors:

- Housing
- Municipal infrastructure
- Health
- Education
- Environment
- Transportation
- Telecommunications
- Electric power
- Oil and gas

This breakdown of the assessment not only helped in covering data from various fields but also assisted the local government and the helping organizations in identifying the most affected areas. This would in turn result in efficient use of resources.

After the Marmara earthquake, the initial disaster assessment by the local government indicated great damage that exceeded the capacities of the official authorities to respond to. Therefore, the government of Turkey urgently requested international help. Help requested included emergency aid, firefighting troops, and recovery and reconstruction assessment. According to the Red Cross and Red Crescent societies, following the Marmara earthquake, about 50,000 people were rescued from beneath rubble, but 98 percent of these were rescued by local residents!

Studying different assessments and reports made during and after the Marmara earthquake indicates the importance of preplanning assessments to be ready and applied timely in case a disaster occurs. Good preplanning and effective performing of the assessment process provides a better chance for rapidly identifying urgent needs to save people and spotting long-term needs to save their future lives.

actions taken to relieve the disaster. The initial assessment forms the baseline of data for the following assessments during the successive phases of any disaster.

General description of the situation: This describes the type of disaster and its impact on the community. Demographics of the population are detailed to a suitable degree. Initial assessment involves appropriate information about the estimated number of the population affected, their lives, and location.

Infrastructure damage: Assessment evaluates the extent of damage to the infrastructure. The degree of damage to different utilities projects itself on both the affected population and the upcoming assistance. Damage to water resources means an urgent need to supply water to the affected population to avoid the many problems that result from lack of clean water. This priority needs mitigation as soon as possible.

Environment: Are there any environmental causes behind the disaster? What are the environmental conditions at the time of assessment? Also, it is necessary to describe any environmental risk factors that are affecting or may complicate the situation and the damage caused to the environment from the disaster.

Shelter: In certain circumstances, alternative shelters are a priority. Shelters need to be suitable to the local community.

Food and nutrition: A general description of the regular food types is provided, along with possible substitutes. Assessment includes the effect of the disaster on the current stock of foods and availability of any substitutes. Other changes affecting availability of food are also described. Prices changes and shortages of certain foods essential to certain vulnerable groups like children or pregnant women are described. Documentation of the nutritional status is important because it affects urgency and types of food supplement needs. Indicators of food shortages like nutritional diseases and nutritional status of special need groups are described. Assessment describes any problems in delivering food to the affected groups.

Water: Because water is vital for life and hygiene, comprehensive data are important, especially in situations where large numbers of the population are displaced. Assessment includes quantity and quality of water available to each person, effect of the event on the regular water resources, availability of substitute resources, and time and effort needed to get water.

Sanitation: The impact of the event on the sanitation system of the community is described. Also, the current condition of the sanitation system and the degree to which it copes with the current situation is documented. In case of any displaced populations, accounting for the sanitation structure and any needs is of paramount importance. Any problem in sanitation systems may be reflected rapidly on the public health of the affected population and result in complicating the situation. Assessment includes number and cleanliness of latrines available to the affected groups and whether there are any problems in using them. Can vulnerable groups like women and children use the latrines safely?

Health: Assessment includes a clear description of the health status of the affected population. Both direct and indirect impacts are needed. Most important are:

- Mortality and morbidity rates
- Morbidity and mortality rates in vulnerable groups
- Causes of morbidity and mortality
- Presence or absence of outbreaks
- Any other issues expected to affect the health of the affected population

In some disasters, injuries are a core concern, for example, in earthquakes. The number of injuries needing rapid intervention may overwhelm local resources. In these cases, the best solution is to get the nearest medical help. Depending on international external medical aid for rapid intervention may result in complicating the situation rather than solving it. External aid takes time to be available that may be not practical with a situation of tens or hundreds of injured in need of rapid intervention.

Also, it is usually better to depend on local medical personnel who are aware of the local community, and its culture, language, and common diseases than foreign medical aid staff. However, in some disasters, expertise in certain fields may be needed. Therefore, careful assessment of the health situation and demands is important in allocating the best possible aid to the affected populations either immediately or on a longer-term basis.

Other (security, political, transportation, etc.): Considering other critical items during the assessment process may be as important as any of the previous items. For example, a general description of the political situation is beneficial in most disaster situations, but in some situations detailed description is mandatory. In complex humanitarian crises, assessment should describe clearly if there are any political conflicts or dominations of certain parties in the situation. Also, it should be documented whether there are any political obstacles that may hinder external aid.

Like the political situation, security is a quite important point to consider. Security affects not only the population struck by a disaster but also the future of any external aid to the area. Stable political and security conditions in an area make assessment easier and assure volunteer organizations about safety of their teams in the area.

The Process of Disaster Assessment

Like any assessment, disaster assessment passes through successive stages. Usually, a disaster assessment involves the following stages: planning the assessment, collection of data, analysis and interpretation, recommendations and reporting, and finally continuous monitoring throughout the duration of the disaster.

Most disasters occur suddenly or shortly after a narrow period of warning, so preplanning for disasters is important. Included in preplanning for any disaster is the assessment planning.

Collection of data takes one or more of several forms of standard data collection, and this depends on the conditions of the disaster and the feasibility of applying one type rather than another. Common tools for collecting data are the following:

- Surveys or questionnaires
- Interviews
- Direct observation by team members
- Using databases of previously processed data

The process of data assessment is ongoing. It starts with planning, depending on the disaster situation. After planning comes collecting data and then analyzing the data to get meaningful information. Information produced is then used to formulate good decisions related to the disaster situation. Decision making, especially in disasters, should be fostered by implementing solutions and monitoring them to apply any amendment needed in a timely manner.

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See Also: Contingency Planning; Criticality Assessment; Damage Assessment; Emergency Management System.

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Disaster Declaration

The emergency management profession has a saying: "All disasters are local." Although this is accurate for those experiencing the effects of an incident, it does not account for the political process involved in having an incident be declared a "disaster." Only the president of the United States can invoke that status over a national incident. A complex formal process has to take place involving local, tribal, state, and regional emergency management in order to get that language assigned. When the president declares a disaster, another formal process begins to implement a prescribed campaign to assist in disaster response and recovery operations outlined in the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Code of Federal Regulations, Title 42 The Public Health and Welfare, Chapter 68, Disaster Relief).

The process of disaster declaration begins at the incident. An incident is a risk that has escalated to a crisis and impacts human populations. These risks may be natural (e.g., earthquake, flood, hurricane, tornado, volcano eruption). These risks may be technological (e.g., cyber attack, terrorism, oil spill). Whatever the type of risk may be, it has intersected with human populations and affected their world.

When the incident begins, the operational response is at the local level through first responders: local fire, law enforcement, and emergency medical personnel. If a disaster response plan exists in the jurisdiction, it is activated at the time of the incident. Local governments often have a memorandum of understanding (MOU) in place with neighboring towns, cities, counties, or regional organizations to assist with these efforts. The MOU assumes that resources named in the memo will be used if available. If both partners in the memo are responding to a similar incident in each jurisdiction, response capabilities remain at their place of origin.

An emergency management department may coordinate local response efforts. These are staffed by professional personnel who work full-time on readiness, response, and recovery programs associated with emergencies and disasters. However, many local governments do not have a dedicated program for this function. Those duties may be assigned to a city manager, mayor, or volunteer coordinator; some local governments may not have an emergency management contact at all. In such cases, local law enforcement coordinates emergency management activities. Whoever is responsible for managing the incident is also the point of contact with state emergency management personnel and is responsible for situation reports, requests for assistance, or activating an MOU. Local facilities for record-keeping about response activities is where data are generated to support the need for a disaster declaration.

When an incident is managed through local response efforts, no formal disaster declaration is issued. If the incident is too extensive to handle locally, officials at the local level request assistance from the governor of the state. This is the next step in the disaster declaration process.

The governor of a state has a variety of operational resource capabilities available to aid local jurisdictions. He or she may activate the state emergency operations center (EOC) to coordinate available state assistance. Depending on the size and scope and impact of the incident, the EOC may be partially or fully activated. If enough local response organizations have requested assistance and it becomes necessary, the governor may proclaim a state of emergency. A series of specific steps must be followed for this process to be legal. These differ from state to state, but most require situational assessment that shows how many jurisdictions were impacted, the potential for other areas to be impacted, and an assessment of life-supporting and critical infrastructure resources that are needed.

When a governor proclaims a state of emergency, the state emergency operations plan (EOP) is activated and provides for the use of state resources. Some of those actions or resources include use of the National Guard, invoking existing mutual aid agreements, and a request for assistance from voluntary or community-based relief organizations (such as the Salvation Army or American Red Cross). The role of state emergency management staff is to assist local and county officials with response operations. The state EOC establishes liaison with county and local officials.

The documentation that began at the local level continues throughout the response operations; critical to this process is the collection of financial data. The state will need to provide evidence for the cost of response operations (e.g., first responders' overtime, use of resources, services provided under an MOU that must be reimbursed, etc.).

Also critical to the documentation process is a preliminary damage assessment (PDA). This takes place at the local level where the incident took place and expands as far out as the damage has occurred. States vary in the process of a PDA, but the goal is to determine the extent of damage to individuals, families, and public infrastructure systems. Determining the scope of damage can determine whether the situation warrants a federal disaster declaration.

When a PDA occurs depends on the severity of the incident and the accessibility of the site. For obviously catastrophic events like the bombing of the World Trade Center in New York City, the PDA was completed almost immediately post-incident and a disaster was declared quickly. For an avalanche in Alaska, PDA teams may not have access to the area for weeks. In such cases, a PDA team might use an airplane to fly over the area to assess the extent of damage, with an on-site visit when it is safe to have people enter the area. Once a PDA has taken place, the governor can request federal assistance.

The Governor's Request for Federal Assistance is a formal written document submitted with the assistance of a regional office of the Federal Emergency Management Agency (FEMA). There are 10 FEMA regional offices that work in partnership with specific states. State Liaisons from FEMA have pre-established relationships with each step and are available to support and partner with state emergency managers who construct the governor's request.

If the president does not declare a disaster, the cost of response and recovery operations lies with the state and local governments. If federal assistance is denied, amendments may be made to the request, and it can be submitted for reevaluation. Most denials happen because the incident does not exceed the threshold of the state and local government response capabilities. Although it may be catastrophic to the individual or community experiencing it, the incident may not be large enough to call upon federal resources; it can be handled with local and state capabilities.

When a state can document how an event will exceed its capabilities to respond to an incident through the formal Governor's Request for Federal Assistance, the president issues an emergency or disaster declaration.

When an incident occurs on the land of a federally recognized tribe or native Alaskan village, there is a variation in the declaration process. The tribe or native Alaskan village has the choice to apply for a disaster declaration directly to the federal government or as a subgrantee of the state in which it is located. Should it choose the direct route, the tribal government applies for federal assistance in the same manner described above regarding the governor's request. If a disaster declaration is granted, the tribe or native Alaskan village manages the disaster response itself and receives recovery program funds directly through FEMA. Should it choose to be a subgrantee, the state uses data, evidence, and information from incident damages to the tribe or native Alaskan village in its PDA to establish the state damage threshold. If a disaster declaration is granted, the tribe or native Alaskan village receives recovery program funds through the state, which manages the incident.

Once the president issues an emergency or disaster declaration, recovery programs are made available to the state, tribe, or native Alaskan village for eligible items according to the Robert T. Stafford Relief and Emergency Assistance Act.

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See Also: Damage Assessment; Disaster, Definition of; Emergency Operations Center; Mutual Aid and Assistance; Volunteer Coordination.

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Disaster Declaration Officer

A disaster is an unexpected event that goes beyond an affected area's capability to respond in terms of saving people's lives, protecting property, and sustaining social, environmental, financial, and political constancy of the affected area. Disasters are managed at the local and state levels by sharing the responsibility to protect people from disasters. In some cases, the capacity of local and state governments may be insufficient to respond to a disaster effectively. In the event that a disaster or chaotic situation occurs or is foreseen, and there is a lack of resources to deal with it, a disaster declaration process must be initiated by the authorized person.

The disaster declaration officer is the person who is appointed and authorized by law to officially declare a disaster. She or he is also the person who is knowledgeable about the magnitude and the consequences of a catastrophic event that requires taking an action to manage it at the local, state, or federal level by allocating resources. She or he activates the disaster response plan in order to convey necessary assistance to people waiting for help.

Local Disaster Declaration

Local response is the first stage for all disasters. When the consequences of an unexpected event such as flood, fire, storm, earthquake, epidemic, drought, or sudden and severe energy shortage, seem greater than the local resources to adequately respond, a local disaster declaration is issued to activate the jurisdiction's emergency operations plan. This declaration states the type of disaster, the date(s) of occurrence, and the name(s) of affected area(s) and must be issued by the city council or the board of supervisors or the person authorized by local law within 10 days of occurrence in order to qualify to receive state assistance; it must be renewed every 14 days. As soon as a local state of emergency is declared, all outside assistance requests are managed by the local office of emergency management. The local emergency management coordinator takes responsibility for dispatching all resources sent to the affected area(s).

State Disaster Declaration

When a disaster strikes, local powers immediately take action for necessary emergency response activities to evacuate the disaster's victims, ameliorate distress, and protect life and property. If local capacities are not sufficient, the local governing body requests the state to declare a state of emergency in order for the state's emergency plan to be activated. The local governing body makes the request to the state within 30 days of occurrence if it is determined that conditions are greater than the local jurisdiction can handle in terms of managing the services, human resources, equipment, and facilities needed and require additional resources from the state. The request explains why state assistance is needed and contains a copy of the local disaster declaration and initial damage estimates. Once the state disaster declaration is proclaimed, state resources are deployed to the affected area(s) promptly. Those resources may be extended according to the type of disaster and assistance required, including equipment, personnel, supplies, technical support, and crucial services such as debris removal, security, traffic control, vaccines, transportation, and traffic control. The state disaster declaration may also make assistance available to the residents in need. Some governmental entities may be eligible to receive a contingent fund loan in order to lessen the impact(s) of the disaster.

Major (Federal) Disaster Declaration

The regional emergency management office monitors disaster conditions and assistance activities before, during, and after the disaster by being in contact with state officials. After the local and state resources are utilized, if there is still a need for additional assistance to better respond to the impact(s) of the disaster, a major disaster declaration is requested from the president by the governor of the state within 30 days of occurrence to have federal assistance.

Before submitting the request, state and federal officials do a joint preliminary damage assessment (PDA) to estimate the scope of the disaster and its effects on people and public facilities. In general, the PDA is prepared prior to the submission of the governor's request. If a severe or calamitous event occurs, the governor's request may be submitted prior to the PDA. Later on, the estimation of the type and amount of federal assistance required is prepared. Additionally, eligibility for federal disaster assistance is reviewed with the regional emergency management director.

The governor's request is made via the regional emergency management office by submitting a summary of the significance of the event; the results of the PDA; the assistance given by federal, state, local, and private agencies; the reasons why the governor requests federal assistance; and a recommended course of action for the president. The regional emergency management office sends the request to headquarters with its recommendations. The details of the request are evaluated and then submitted to the president.

The president makes the decision whether to approve the declaration; approval activates a group of federal programs to support the response and recovery activities. The request is turned down if it does not comply with the recommended criteria of approval. The governor may appeal a disapproval. The appeal must be submitted within 30 days by presenting further new information for reconsideration of the original request. When the major disaster declaration is approved, some or all of the federal disaster assistance programs such as individual assistance, public assistance, and hazard mitigation assistance are activated.

Rescinding the Declaration

When the circumstances are stabilized and there is no longer a need to have special orders in effect, the declaration is rescinded. Upon rescinding the declaration, the local office of emergency management is notified.

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See Also: Disaster Declaration; Emergency, Definition of; Emergency Manager; Emergency Support Functions.

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Disaster Drills

Disaster drills, or exercises, are tests of the ability to respond to crisis situations designed to familiarize participants with the processes involved, ensure rapid and efficient action, and ensure that people are able to work well together. There are four main types of exercise. Tabletop simulations involve working one's way through a scenario. Command post exercises are designed to test command and control functions. Emergency procedures drills can be used to test procedures such as mass evacuation or rescue. Finally, field exercises are the most extensive and realistic option, but also the most exacting and expensive one. The remainder of this article concentrates on drills in the field, which usually mean extensive outdoor work.

Exercises can be used to test and evaluate plans and procedures and to show their weak points. They can help clarify and familiarize people with emergency roles and responsibilities and, in particular, help organizations and individuals to work together during unfamiliar situations. Hence, drills usually have an education and training function, and they can highlight the need to extend this in particular directions. They can also highlight inadequacies in equipment or staffing. Drills are useful for improving the quality of messages exchanged during a crisis and to make information exchange and usage more efficient. Lastly, exercises can help garner support for disaster risk reduction and can thus have an impact on relevant policy. Typically, a field exercise may take 6–24 months to plan and 8–48 hours to run. It is carried out in real time and involves the typical stresses of the job.

Designing a Drill

The first step in designing a drill is to assess the capabilities of organizations that will participate. These include the ability to design, run, and benefit from the exercise and the presence of sufficient funds, time, and personnel to realize the project. An assessment must therefore be made of personnel, skills, physical facilities, and communications equipment. It is also necessary to assess attitudes in order to ensure that an exercise will have sufficient support at all levels within the participating organizations. Assessment of costs will determine which resources can be dedicated to the exercise. Estimation of costs should include staff salaries and overtime, contract and consultant services, equipment and materials. and, where necessary, the hire of facilities.

Once the feasibility study is ready, a steering committee needs to be appointed under the guidance of the general director of the exercise. To conduct the exercise, there will need to be one or more controllers, as well as groups of simulators, players, and observers (Figure 1).

An exercise is usually based upon a real event from the past (the reference scenario), updated to conform to modern conditions (Figure 2). To be similar to a real crisis situation, it is necessary to launch the simulation without informing the participants in advance. In practice, this involves so many complications and liabilities that very few organizations are able to do so. Hence, most drills are fully anticipated by participants.

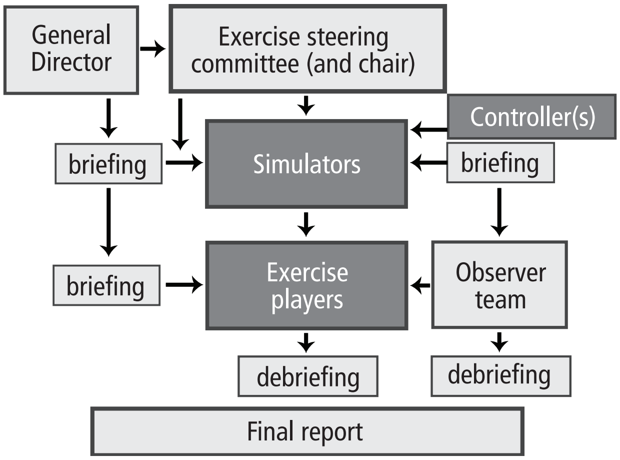
General Director
Exercise steering committee (and chair)
Controller(s)
briefing
Simulators
briefing
briefing
Exercise players
Observer team
debriefing
debriefing
Final report

Figure 1 The structure of a disaster exercise

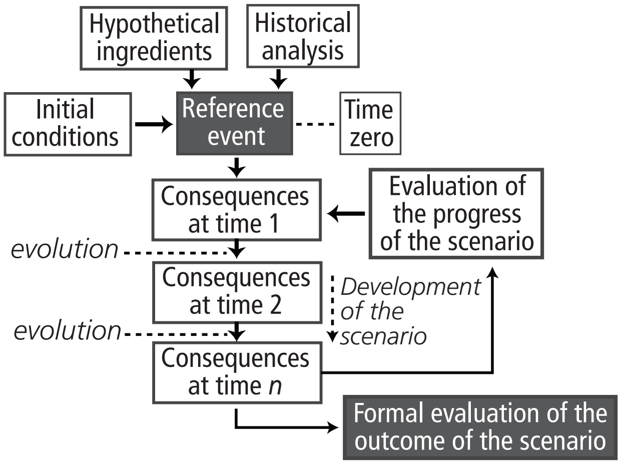
Hypothetical ingredients
Historical analysis
Initial conditions
Reference event
Time zero
Consequences at time 1
Evaluation of the progress of the scenario
evolution
Consequences at time 2
Development of the scenario
evolution
Consequences at time n
Formal evaluation of the outcome of the scenario

Figure 2 The use of a scenario or reference event in the construction of a master sequence of events

A disaster field exercise needs to be planned, executed, and evaluated. It must be created in response to clear objectives that can realistically be achieved in the available time and with accessible resources. Planning should involve estimating the needs (for example, with respect to training or benchmarking crisis responses). Once the scope and objectives have been established, it is usually necessary to write the master narrative based on the reference scenario. This details the sequence of events that will have to be responded to by the exercise players. It also defines the expected actions. In many cases, narratives are accompanied by a series of situation reports that detail the progress of the crisis after set time intervals. Time is usually compressed to some extent so that the simulation can fit into the time available to conduct it. A further subset of the main narrative is the set of emergency messages that will be distributed during the simulation and that will solicit responses from the players. The narrative is compiled in the form of a master sequence of events list (MSEL). Finally, the exercise designers allocate tasks to participants, including the simulators, players, and observers.

The Participants

The exercise controller (or controllers, if it is a large, complex simulation) should have complete authority over the drill and must ensure that it fulfills its objectives. Using the flow of emergency messages, the exercise controller can speed up or slow down play in order to maintain the momentum of responses. The controller must solve problems as they occur and finally stop the exercise once it has met the defined objectives—or if it goes seriously wrong.

The simulators are responsible for sending emergency messages. They usually work in isolation from the players. All groups should be given a full briefing on the aims, scope, and nature of the exercise (Figure 1), with subsidiary briefings to explain particular roles. All participants are required to monitor safety and empowered to call a halt to operations if it is compromised. There should also be one or more safety officers who are concerned with nothing else. An evaluation of risks to safety should be conducted before the exercise is launched.

Because the general aim of drills and exercises is to learn lessons in order to improve future practice, one of the most important aspects is the real-time evaluation process. The group of observers needs to be trained and forms need to be developed in order to ensure that they acquire the right information during the exercise.

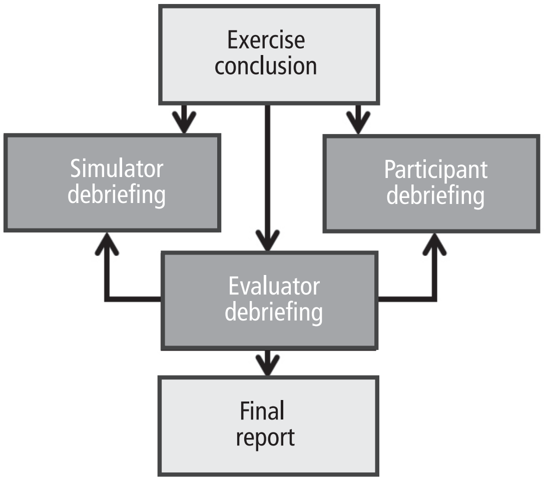

Figure 3 Debriefing and the final report at the end of a disaster drill

Evaluation Processes

The process of evaluation is based on description, deduction, and judgment. Observers need to evaluate actions, not people. They must do so as objectively as possible, without interfering with the course of the exercise, unless there is a safety problem. Evaluation should involve describing the actions taken by players and judging them in relation to the objectives of the exercise. This needs to be done in a spirit of detachment, above all from personal considerations. It is as well to remember that (excepting cases in which safety is compromised) it is legitimate to make mistakes in exercises providing that personnel and organizations learn from them. The evaluators will be called upon to collate their observations and judgments in order to review the progress of the exercise.

It is vital that evaluators do all they can to maintain their objectivity. Tiredness, prejudice, prejudgments, and preconceptions can all threaten this. Moreover, personnel who are under observation may react to the presence of the observer. Nonetheless, evaluators need to avoid being either too lenient or hypercritical. They need to steer clear of bias, distraction, and preconception, and they need to maintain their motivation even after many hours of observation. It thus helps to select observers from among people who have appropriate personalities and experience.

The Final Outcome

The work of the evaluators and the learning experience of other participants need to be distilled into a final report on the exercise (Figure 3). Debriefing should be conducted for each group and perhaps for the entire cast of participants. "Hot" debriefing takes place immediately after the close of play and enables first impressions to be recorded, along with information that might otherwise be forgotten. "Cold" debriefing takes place after an interval of time, perhaps a couple of days, during which the participants have been able to reflect on their experiences. In the debriefing, information is shared, perspectives are compared, suggestions for improvement are recorded, deficiencies are noted, and training needs are identified.

A mass-casualty field exercise in Tuscany, Italy, involving groups of medical responders and the setting up of a field medical post. Frequent disaster drills should be considered crucial for emergency teams, which may have high staff turnover.

The final report should offer a comprehensive picture of the exercise. This includes its motivation, objectives and scope, a description of preparatory activities, and a list of participating organizations. The progress of the exercise should be described, accompanied by an assessment of positive and negative developments. Recommendations for training, improved practice, new equipment purchases, and other aspects should be made. Once again, the purpose is not to incriminate poor performers but to ensure development and improvement of the practice of responding to crises.

In the emergency response field, there is an unfortunate tendency to consider drills and exercises as one-off, unique initiatives. The better strategy, albeit one that is more expensive, is to make these events part of a long-term process of improvement. In this, next year's drill will build upon the results of this year's exercise. Not only does this make the process of learning and improving cumulative, but it also ensures that experience and lessons are not lost, as can happen when there is a high staff turnover or real emergencies are quite uncommon. In summary, disaster drills are memorable, potentially valuable events that can be used creatively to improve the capacity to deal with emergency situations.

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See Also: Collaboration; Continual Improvement; Coping Capacity and Response Capability; Crisis Simulations; Debriefing; Exercises; Pre-Crisis Training and Planning; Simulations; Training.

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Disaster Recovery

Disasters affect people and communities, disrupt societal functions, damage or destroy essential infrastructure, and interrupt economic activity on a scale that means that recovery can take months or years. Recovery strategies typically treat mental health, social, economic, and infrastructure recovery independently. However, effective recovery requires acknowledging their interdependence. For example, mental health and social recovery increase the likelihood of people being available to assist physical recovery and rebuilding efforts and to support business and economic recovery (as employees and customers). Business recovery provides employment and sustains economic vitality. Social and business recovery ensures the availability of a workforce to repair services and infrastructure. This article draws on mental health, social and community, business, and infrastructure recovery to illustrate comprehensive disaster recovery.

Mental Health

In a disaster, ordinary people and emergency workers respond in several ways. Past experience indicates that serious mental health difficulties such as post-traumatic stress disorder are problematic for a minority of people, affecting some 10 percent in major disasters. Other problems include clinical depression, anxiety, or behavioral problems. Some people with preexisting difficulties may find their symptoms exacerbated. However, the more common experience is a transitory adjustment, where symptoms of distress may be common, lower in severity, and relatively short-lived. For this larger proportion of the population, ensuring that their basic needs (food, water, shelter, security, and family reunification) are fulfilled in the immediate aftermath assists their recovery. Training in basic psychosocial support for responders delivering the basic necessities allows them to deliver these in a supportive, enabling way so that those affected can start using their own personal resources to start coping.

Some people may continue to experience a natural reaction of mild to moderate psychological distress in the medium term, despite their basic needs having been met. For this group, a twofold approach is useful. A wide-ranging needs assessment will inform community-led, culturally appropriate, agency-supported psychosocial support activities. These may help families process their experience and adapt to changes in a post-disaster world.

Intervention can reassure people that their feelings are understandable, common, and to be expected given their experience. People should be advised of typical symptoms and reactions (e.g., flashbacks), how they change over time (e.g., anniversary effects), and that the course and time taken to recover differ substantially from one person to another.

Community support is helpful. This can be delivered via individual, family, or group-level interventions that directly address the psychological symptoms for affected persons and those whom they are concerned about (e.g., children, other community members). Children recover well if their routines are quickly reestablished. Returning to their school schedule allows them to keep up learning and to recover in a known, supportive, social environment. Parents are then freed to focus on the myriad tasks they need to address in the recovery phase.

Psychological first aid, delivered by trained personnel, can be useful in this context. For those more seriously affected, or whose difficulties persist for an extended period of time, more specialized, professional services should be made available.

Often, mental health issues become evident later. An attitude of "watchful waiting" can detect many of those requiring assistance, but more proactive approaches should also be prepared. Basic training on common reactions in disaster events is recommended for local general practitioners and teachers who are in the front line of meeting the needs of affected populations. The effectiveness of these activities can be enhanced by integrating mental health and social recovery initiatives.

Social and Community

Social recovery starts with assuming that survivors possess resources and strengths that help them deal with challenges under normal circumstances. Intervention identifies and mobilizes existing strengths and uses bottom-up approaches based upon participation, empowerment, and trust to assist people to apply them in extraordinary circumstances in which usual routines, coping, and support resources have been overwhelmed by the atypical and intense physical, social, and psychological demands presented by the disaster. This process starts by ensuring access to social support.

Social support helps people deal with emotional (e.g., grief, anxiety), tangible (e.g., child care, financial), and informational (e.g., about recovery, assistance programs) issues. If support resources are facilitated by external agencies, they should accommodate local culture, needs, and expectations. A supportive social environment provides the foundation for other social recovery initiatives.

While focusing on strengths, it is important to acknowledge that people and communities possess characteristics that make them vulnerable to experiencing loss and mental health problems. Recovery planning must accommodate both.

Strengths include spiritual and cultural practices, active coping styles, collective efficacy, and community competence. Vulnerability factors include learned helplessness and community fragmentation. In rural communities, vulnerability encompasses, for example, lower levels of resourcing, economic activity more susceptible to disaster-related losses (e.g., agriculture, fishing), agricultural and livestock losses, loss of support systems if entire communities are affected, and rural self-reliance reducing people's willingness to seek or use external assistance.

It is important to appreciate that vulnerability and strength factors coexist. People possess both at any one time. It is how disaster consequences interact with the relative balance of strengths and vulnerabilities that influences the course and nature of social recovery. However, because all people and communities have strengths, strengths represent a starting point for all social recovery activities. Coexisting vulnerability factors should, however, be accommodated in planning and used to predict differential rates of recovery. Focusing on strengths helps all people confront issues in ways that promote natural recovery.

Intervention Objectives

Recovery is built on communicating with communities to clarify what has happened; what is likely to happen over the short, medium, and long term; and helping people identify the strengths and resources they can use to assist their recovery. However, the atypical and challenging circumstances of the post-disaster environment mean that people benefit from guidance on identifying issues and applying their strengths to tackle them. Intervention focuses first on short-term goals.

Focusing on-short term goals prevents people being overwhelmed by the number and magnitude of recovery issues they face from environmental, home, and employment disruptions. It helps people regain a sense of control and allows them to practice using their problem-solving, decision-making, planning, and implementation skills to tackle issues in ways that are more likely to be successful. This helps people build the competencies and confidence to work on other recovery challenges over time.

Recovery planning places considerable importance on accommodating spiritual and cultural values and practices (e.g., rituals and ceremonies) in needs assessment and intervention planning, design, and evaluation. This process can be expedited by working with community leaders. Working with local leadership to accommodate spiritual and cultural practices increases the validity of intervention, empowers communities, builds trust between the community and professional agencies, reduces community dependency on external

Case Study: Recovery After an Earthquake in Canterbury, New Zealand

The earthquakes in Canterbury, New Zealand, from 2010 to 2012 created unprecedented demands on agencies tasked with disaster recovery. An earthquake sequence of this nature and extent in Canterbury was unanticipated, and the multiple agencies involved needed to rapidly coordinate their recovery planning. The earthquake on February 22, 2011, highlighted an acute need to garner a breadth of New Zealand and international disaster recovery expertise to help inform the many facets of a rapidly developing recovery context. To pursue this objective, a Psychosocial Recovery Advisory Group was formed to help support organizations involved in the recovery process. This advisory group reviews and summarizes evidence-based research findings for those who make requests for such information. Extensive experience within the group adds a practitioner perspective to this advice.

The advisory group utilized empirical evidence to underpin the delivery of timely but quality advice. This evidence highlighted the need to provide many levels of intervention, ranging from the general provision of basic living requirements and psychosocial support to specialized interventions for a small proportion of the population suffering from the impact of individual trauma and related difficulties. All advice focused on a psychosocial approach that aims to ease physical and psychological difficulties for individuals, families, extended family (*whanau*), and communities, as well as building and bolstering social and psychological well-being. This entails addressing vulnerabilities as well as looking for and enhancing the strengths of affected individuals and communities, including cultural practices. The broad nature of psychosocial recovery goals demands collaboration between an extensive range of professionals such as psychologists, sociologists, emergency managers, economists, and urban designers.

The group's working definition of psychosocial recovery includes aspects of mental health needs and psychological support alongside communities' capacity to respond and adapt in the face of adversity. This definition also focuses on the importance of community participation and engagement within recovery governance, which has important effects on populations' recovery, resilience, and adaptive capacity. Recovery was understood to encompass individuals and society coping positively with a disaster that has psychosocially and physically changed.

Advisory group collaborations have highlighted practical components of a strength-based approach to recovery: assisting goal setting and problem solving, social support, appreciating cultural and spiritual practices and community diversity, and the importance of coordination and integration.

The advisory group also seeks to advocate the resourcing of integrated monitoring and evaluation that, like other aspects of longer-term planning, could be easily neglected within the ongoing challenges of recovery in the Canterbury region.

The group has focused on maintaining an ability to cooperate and collaborate effectively, building strength from the diversity of member backgrounds and approaches. A recovery process is a vast activity where different perspectives and conflicting needs operate simultaneously. In a disaster recovery situation, these conflicting demands and interests can lead to ineffective dynamics. The advisory group has found a modus vivendi of functioning together to produce documents and support for clients, despite having diverse interests and frameworks. A clear demarcation of roles and processes within the group, along with flexibility when responding to demands, is a factor in developing this efficiency.

An advisory group that can take time to research and reflect, to take a step back from operations to examine and search for pertinent material, can be a positive element in disaster recovery settings.

To date, the group has worked with numerous key agencies, including the Canterbury District Health Board, the Ministry of Social Development, the Ministry of Education, the prime minister's chief science adviser, and the Christchurch Earthquake Recovery Authority. The group has responded to requests by researching and providing evidence-based advice on specific aspects of psychosocial recovery processes and the style and scope of interventions. An advisory group can play a positive role in recovery, beyond the initial planning stages.

resources, helps maintain community identity, and sustains culturally appropriate support systems. Recovery planning should accommodate demographic diversity. Despite experiencing the same disaster, certain groups (e.g., children, elderly people, and people with chronic illness or disability) present unique recovery needs. People who are injured; have lost family members, homes, and livelihood; or been relocated also present unique needs, as do family members living in other parts of the country. This diversity must be accommodated in needs assessment, response planning (e.g., diversity in support needs), and intervention. Social recovery is also dependent on business recovery.

Business Recovery

Business recovery facilitates business survival, protects people's livelihoods, and sustains social and economic vitality in disaster-affected areas. Businesses that sustain their activity or recover quickly can assist recovery for employees (such as by social support) and the community (by providing things like donations of cash, technical expertise, and equipment).

Business continuity (recovery) planning is an important, but often neglected, issue. A survey in 2008 in the United States identified that while 96 percent of senior executives surveyed acknowledged that their business was exposed to natural hazards (e.g., hurricanes, earthquakes), fewer than 20 percent had developed business continuity plans to cover such eventualities.

Businesses must plan to recover from direct (e.g., damaged building) and indirect (e.g., loss of power and telecommunications, damaged roads) interruptions to their activity (e.g., loss of/inability to access premises; loss/damage to equipment, goods, and materials; inability to acquire and distribute goods and materials; employees unable to get to work; and loss of critical data) and changes in patterns of consumption. Affected populations may reduce consumption of nonessential goods and services (e.g., restaurants, cinemas). However, businesses meeting basic and recovery needs can, if prepared, take advantage of increased demand for things like building and infrastructure reconstruction.

Business continuity planning should develop crisis management and information systems and safeguard existing systems (e.g., digital backup and/or substitutes) to facilitate continuity of core business. Recovery planning should accommodate issues such as conducting core operations away from headquarters, dealing with casualties and deaths among staff, and reconciling work and family needs. Plans should be developed in a consultative manner to ensure they are familiar to and accepted by staff, and be linked to training programs and exercises. Collaborative planning provides staff with evidence of organizational concern for their welfare and a shared responsibility for recovery, sustains staff loyalty, and ensures the availability of a supportive culture. The effectiveness of business recovery is dependent on infrastructure recovery.

Infrastructure Recovery

A community's infrastructure, such as roads, electricity supplies, water, and waste water, provides essential services, utilities, and linkages that support day-to-day community activities and represent mechanisms used to respond to and recover from disasters. Many of these functions are vulnerable to disruption and/or damage from a disaster. Because these systems are often large, complex, and interdependent, failure of one part of the system causes impacts in other parts, further increasing a community's vulnerability. Pre-event recovery planning is essential for making systems resilient. Once the vulnerability of a system has been assessed and vulnerable elements identified, mitigation strategies can be developed. Three types of approaches can be used: policy and management measures that reduce the likelihood of damage and/or failure, engineering design measures that reduce the vulnerability, and preparedness and response planning to deal with the consequences of the event. In the recovery phase, the rapid restoration of key infrastructural functions reduces both social and economic impacts and facilitates improved recovery outcomes. However, the initial recovery phase of a disaster is marked by high resource demand, so careful prioritization is needed to balance these competing demands to optimize the benefits to the wider community.

Public and medical services also play key roles in disaster recovery. By managing interdependencies between them and mental health, social and societal, economic, and infrastructure recovery, comprehensive disaster recovery can be facilitated.

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See Also: Business Continuity Planning; Data Recovery; Disaster Recovery Life Cycle; Health and Medical Response Scenarios; Mental Illness; Post-Traumatic Stress Disorder; Public Health Surveillance; Recovery.

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Disaster Recovery Life Cycle

Disaster (or emergency) management is typically broken into four main processes (also referred to as phases): mitigation, preparation, response, and recovery. The first two processes focus on reducing the risk from potential future disasters (mitigation) and making plans and structures to deal with post-disaster efforts (preparation). Response and recovery are, respectively, the short-term (e.g., lifesaving) and long-term (e.g., rebuilding) work that begins after a disaster has occurred. The lines between these four processes are fuzzy. Mitigation and preparation often occur simultaneously and are complementary processes. Similarly, response and recovery overlap as the initial response phase winds down and recovery begins. The actors (governments, businesses, nongovernmental organizations [NGOs], churches, militaries, etc.) involved in disaster response and recovery often work to use the momentum for change after a recent disaster to encourage risk reduction, better infrastructure, and improved planning.

Disaster Recovery

The end of disaster recovery is unclear because once a disaster has occurred, the physical and emotional impact on a community can be long lasting and hard to quantify. Disaster recovery begins after the disaster has occurred and there is no longer a consistent threat to life and property, often overlapping with the second half of the response phase. Disaster recovery includes any activity or investment that was made in response to a disaster event to replace, repair, or improve private or public assets. The recovery phase ends when the previous disaster event is not used as the conscious or unconscious reason for any replacement, repair, or improvement activity. The recovery life cycle (RLC) is a step-by-step process that occurs during the recovery phase of disaster management. Here the RLC is broken into seven components that may overlap or even have a different order, depending on the disaster and the people and organizations working with the impacted population and region.

Assessment and Recovery Coordination

Before recovery can begin, it is important for individuals and agencies to identify the state of the impacted community. Typically, a central coordinating body or authority emerges for each geographic area to help ensure safety and continuity of assessment activities in future operations. In cases where the disaster recovery operations are primarily performed by national actors, the government with jurisdiction helps coordinate assessment and recovery activities in accordance with whatever structures or plans are prescribed. Any actors from outside the impacted area are required to conform to local standards and limitations. In cases where a national government is overwhelmed by a disaster or poorly equipped to handle the scope of the recovery operation, the United Nations may work with the national government to perform management and coordination of the impacted areas. Assessment of the damage caused by the disaster and a needs assessment for short- and long-term concerns are performed by many of the actors during the recovery phase, after the primary threats to life and property have been neutralized.

Transitioning Out of Response

Depending on the degree of damage to disaster survivors' property and local infrastructure, it may be necessary to provide transitional housing and services. Transitional housing serves as an intermediate from emergency housing (stadiums, churches, schools, community centers, etc.) provided during the response phase and a return to homes/communities of a "normal" pre-disaster condition. Transitional housing provides a short-term solution to getting communities on a path to recovery by returning public facilities to public function while simultaneously giving survivors space of their own. It is important that transitional housing construction and allocation is equitable and has buy-in from the impacted community. However, provision of such quarters, along with basic water, health, and sanitation provisions, can complicate long-term recovery in the event that the temporary housing is more attractive to survivors than the pre-disaster housing situation. This potential conflict creates a moral hazard where disaster managers must choose which level of amenities and comfort to provide disaster victims that meets needs but also encourages continued progress and locally driven development.

It is important to provide transitional activities for the local populace that generate buy-in for economic and social redevelopment, Schools returning to session, even in a limited capacity, help provide children with daily tasks. Similarly, providing good transitional work is important to help the local workforce gradually return to a productive state, while also avoiding overstimulation in any particular sector of the economy. One key component of the transitional period is the clearing of debris left by the disaster from infrastructure (roads, bridges, waterways, electric grid, etc.) to return them to a usable state, and private property to make way for rebuilding activities.

Rebuilding and Mitigating

Rebuilding is defined as the construction and overhaul of previous and existing infrastructure to the previous state. However, an important aspect of the rebuilding process is when construction projects go beyond merely replacing what was lost, or returning damaged structures to a pre-disaster state, and focus on improving upon the pre-disaster state while incorporating aspects of mitigation into the design and development process. Critical infrastructure reconstruction is important and includes the water/sewage lines, electrical grid, transportation network, and telecommunication channels. Actors involved in the recovery process have taken note of the momentum for real change and risk reduction that often follows a disaster event, and it is important to capture this energy to help improve infrastructure and procedures to reduce the impact of future threats and hazards.

Economic Revitalization

As the rebuilding process gets under way, developing and restructuring the local economy becomes a high priority. It is critical to a successful recovery operation that improvement of the physical infrastructure is accompanied by an economic and social resurgence to fuel continued improvement. This process typically moves to central focus after the basic needs of the population have been met and some sort of shelter and relatively consistent feeding structure is in place. Actors involved in the recovery process may choose to focus on production and purchase of locally produced goods rather than importing necessities and labor from outside the disaster area. Local businesses may rebound with the influx of recovery investment (e.g., restaurants or hardware stores), while local farmers and businesses without a clear disaster niche may attempt to rebuild using government grants and loans, private investment, or insurance payments. The return of economic stability is a long process but is a critical piece of the recovery life cycle.

Local Empowerment

As the recovery process progresses, the presence of external actors in the daily life of the local populace (increase in traffic volume, higher prices for basic commodities, etc.) may begin to become more apparent. However, because external government agencies, private businesses, and other actors have been performing essential services in the disaster-affected area, the transition of control and ownership of the recovery process must make a gradual shift toward locally driven efforts for improvement. External actors may choose to reduce their involvement and hand operations over to local partners or subsidiaries. In some cases this process can take months or years, depending on the culture, level of destruction, and future aspirations of the local populace.

Exit of External Actors From Disaster Area

The eventual exit of external actors from the impacted areas is a significant transition period and a good test of the stability of the revitalized local economy and social will toward improvement. Local businesses that grew up around the recovery effort (construction businesses, etc.) must refocus or move into new arenas of work as the relief money begins to dry up. Insurance money provided to home and business owners tends to have already disappeared by the time the external actors move on. New procedures and mitigation techniques will be tested for the first time to see if they were viable and sustainable improvements upon the pre-disaster state.

The New “Normal”

A new “normal” is developed as the local populace incorporates the past disaster into local culture and customs or ignores the warnings and possible danger. An effective recovery operation should avoid returning a community to its original state without some improvement or alteration to reduce future hazard vulnerability. However, during this stage of the recovery life cycle, the local population is primarily responsible for deciding whether the change in lifestyle, culture, and outlook is worth the cost. Ideally, this is the stage where mitigation and preparation will have reduced the risk from future disasters, and the local community will continue to develop and grow while integrating the lessons of the past.

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See Also: Catastrophe, Definition of; Critical Infrastructure; Damage Assessment; Disaster, Definition of; Disaster Assessment; Disaster Recovery; Disaster Recovery Plan Test Cycle; Emergency Manager; Federal Emergency Management Agency (FEMA); Hazard Mitigation; Incident Management; Incident Response.

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Disaster Recovery Plan Test Cycle

According to federal information processing standards (FIPS), a plan untested is presumed not to work. Plan testing is not only necessary for the good of the organization but also required by regulatory agencies in most cases. The test offers benefits, though, including a determination of whether the recovery process actually works and whether the alternate site is adequate. It also helps to establish that the assorted teams working on recovery have suitable procedures or that procedures are deficient and team members and managers need additional training. It also provides assurance that the organization really can recover from a disaster.

The events of 9/11 revived interest in planning, with 54 percent of 320 surveyed information technology (IT) professionals responding that the World Trade Center and other attacks would change their disaster recovery plans (DRPs) and 65 percent anticipating a rise in spending on IT disaster recovery. The disaster recovery plan shifted from being a good idea to being an essential one, particularly as management came to see its necessity rather than its expense. Staff and financial shortages and complexity were still deterrents reported in the *Disaster Recovery Journal* survey of May–June 2001. Management commitment comes when managers are made aware of the impact on their business, when risk and outcome analyses are presented in terms understandable by managers, and when managers know that an untested DRP is a virtually guaranteed real-world failure if activated because its assumptions are untested. Like any plan, like any part of business or life, the DRP is not a document but a dynamic process, and it requires regular maintenance and testing.

Limiting Factors

Testing varies according to size of facility, reliance of the organization on IT, user expectations regarding level of service, acceptable downtime and contingency processing time, number of locations included, and costs of testing. Each is a limiting factor.

Disaster recovery is often a paper exercise. Organizations draft a plan, management blesses it, and the paper or electronic copy goes onto a literal or figurative shelf, never to be seen again until time for an update. *Disaster Recovery Journal* reported in 2001 that its online poll of May and June that year indicated that of 2,223 respondents, 65.5 percent had not tested their DRP in a decade, and another 26.32 percent had tested it one to three times in the same decade. The 10 years in question included earthquakes, hurricanes, the Murrah Building bombing in Oklahoma City, the first World Trade Center attack, Y2K, and 9/11. Another study, this by KPMG, indicated that half of DRPs evaluated met an acceptable share of their recovery goals.

Natural disasters such as hurricanes and earthquakes generally encourage businesses to either develop or update the organizational disaster recovery plan. But the plan means nothing if it’s not tested before, during, and after implementation. Testing determines whether the plan is effective or “wallpaper,” so the test must be as carefully developed as the plan is.

Test results cannot be 100 percent certain. That is too expensive, disruptive, and cumbersome, so it is essential to define what business processes to test. Before testing anything, review the DRP list of business-critical processes, determine whether the list is current, and double-check priorities based on business impact analysis and risk analysis (threats, vulnerabilities, safeguards). High business impact analysis (BIA) and risk assessment (RA) scorers are obvious choices for testing. For the less obvious processes, a ranking system based on hard data rather than subjective evaluation is necessary.

Prioritizing

The Business Continuity Institute of London suggests a four-step process of prioritizing: first, isolate testable processes; second, reassess the BIA on a scale of zero to five; third, reassess the RA on the same scale; and finally, matrix the BIA/RA results and, using an agreed-to score as the testing level, select items fitting the standard. If the data are current and the boundaries for testing are management determined, then there is a reasonable set of processes that should be tested.

The plan testing should also involve collateral skills, not just recovery of critical systems. Disaster skills include first aid, competence in breathing apparatus and fire extinguishers, evacuation of personnel and resources, emergency communications, and shutdown for utilities as well as equipment. Recovery personnel need current training or education in these special skills, with multiple competencies when possible. These collateral elements can determine the success or failure of the plan as well as the speed with which it takes place.

That is the easy part. Having determined what to test, the issue is how to test. Constraints at this point include maximum testing of the DRP, costs and service disruptions kept below the prohibitive level, tests actually measuring capability to recover, and test results actually going into the upgraded DRP.

Testing Cycles

Organizations can perform their own structured walk-throughs, checklists, simulations, parallel tests, and full interruptions. They can also incorporate into the plan, if not the testing cycle, the out-of-cycle real-world disasters or problems, an opportunity for ad hoc documentation and incorporation without test preparation. Having established the goals and constraints, the planner next develops a cycle, a phased sequence of tests that employ assorted methodologies, that become increasingly complex as the cycle progresses, that are assessed individually as they occur, and that allow for incorporation of improvement and error correction before the following phase. If the cycle is done properly, it will have tested every aspect of the plan by the time it's done, and it will have tested and updated many portions of the plan several to many times. The test cycle is iterative, so the DRP remains dynamic, always changing as hardware and software change, as configurations adjust, and as business processes change in response to new market needs and service expectations. For the DRP to remain relevant, at the end of each phase or each exercise, there must be a debriefing, audit, and analysis so that the test plan used for the next phase or exercise is valid.

objectives
menu
settings
PPE 7/20
1/4
1/1
3/4
police
fire
hazmat
staging area
medical staging

With funding from the Department of Homeland Security Customs and Border Protection, Sandia National Laboratory is fine-tuning an interactive gaming platform (above) known as Ground Truth, which is designed to prepare crisis managers for terrorist attacks.

Limited-scale testing allows correction and elimination of logistical errors that might prove to be major problems in full-scale testing. The DRP testing environment, because it is limited and minimizes cost and disruption to people and products, is a low-pressure exercise that promotes education without duress. The plan cycle becomes part of the work environment, and disaster recovery is something that all workers are prepared for.

Checklists

Checklists are cheap to create, implement, and maintain, suitable for team exercises, and extremely valuable. They are handy for rating key procedures, emergency call trees, adequacy and currency of tape library and operational manuals, and other documentation.

A checklist test allows verification of amounts of supplies at the alternate site, telephone number currency, availability of adequate numbers of forms, and availability of copies of the plan and operation manuals. The team examines the plan for key elements, then uses the checklist to make sure the organization has all those elements.

Walk-Through and Tabletop Exercises

Walk-through exercises are an opportunity for team members to go through the plan-specified steps to identify bottlenecks, gaps, and other shortcomings and to determine the adequacy of the entire sequence. Checklists are useful in walk-throughs once the checklists are validated. The walk-through brings in more people, more knowledge, and more experience, and it familiarizes more staff with DRP procedures, equipment, and off-site facilities.

The tabletop is a conference room walk-through, step by step. Tabletops reveal whether team members know what they're supposed to do in the emergency. They also reveal missing and inconsistent information and documentation errors. The combination of checklist and walk-through should suffice to modify the plan before undertaking more ambitious test types.

A tabletop should be built into the cycle every two to three months and take 90 to 120 minutes, with a 30-minute debriefing to follow. A functional test is a simulation and should take 90 minutes to four hours and occur each three to six months. A full-scale test should not last more than two to eight hours and should occur every four months, if not more often.

Simulation

Another element of the cycle is the simulation. Simulations can be done without disruption to the normal operation of the facility. Ideally, a simulation provides vigorous testing of all assets—hardware, software, personnel—as well as communications, supplies, transportation, utilities, documentation, forms, and procedures. Testing of alternate site processing is also desirable. But simulations, for cost and other constraint reasons, will not normally entail major transportation, relocation of equipment, or shutting down of data or communications. Alternatives for measuring these elements are found in validated checklists. A simulation is more advanced than a walk-through or checklist and can occur legitimately only after those tests have taken place and had their results analyzed and validated. Incorporation of lessons learned from earlier exercises or phases is a key component of any disaster recovery plan testing cycle.

Simulation testing pretends a disaster while the organization continues its daily functioning. The scenario should be realistic and appropriate to the purpose and objectives of the test, the type of test used, timing, scheduling, and the like. Simulations can test notification procedures, temporary operation, and backup/recovery. The simulation needs to test hardware, software, communications, supplies, forms, personnel, utilities, transportation, and alternate site. It does not necessarily involve actual travel or movement of equipment or the shutdown of voice or data lines.

The simulation uses recovery sites, backup systems, possibly teams sent to alternate sites, and other resources. Simulations approximate full-scale tests and work best when they incorporate scenarios of various types. They reveal staff issues about who does what.

Parallel Testing

Parallel testing can take place in conjunction with a checklist or simulation. Parallel testing involves using historical transactions against backup files at a hot site or alternate site. If the alternate site reports agree with those of the actual business, then the test is satisfactory. This test is the most advanced and requires incorporation by the tester and test of all previous lessons learned. Parallel testing uses historical transactions against the appropriate backup files, usually yesterday's transactions and backups, at the hot site. If reports at the hot site and home site match, the systems work.

Full-Scale

The least common test is the full-interruption test in which all elements of the DRP are activated at once. It is expensive and probably disruptive to normal operations and must be approached cautiously with full incorporation of all previous-phase lessons learned. Full interruption testing is expensive and should be used carefully, not at critical processing times, and be of a reasonable duration to measure responses.

Enhancing Effectiveness

All tests produce surprises, but the goal of testing is not perfection but the reduction of error, and the cheapest way to reduce the likelihood of error in the advanced tests is to use the checklist and walk-through properly early on.

A test cycle does not require use of all of the advanced methods, but it should include the two lower-level tests—checklist and walk-through—and at least one advanced test.

An effective test cycle requires an effective and broadly skilled team, including management, finance, legal, personnel, security, and the owners of the process being tested. Multiple owners need to be represented for most tests, which tend to overlap systems (that do not run in isolation normally). The actual tests are run by security, safety, and audit personnel.

The output of the testing cycle phases and of the test cycle itself is an audit and analysis for lessons learned and improvement. Each phase is stand-alone for auditing, and the final audit is of the overall test cycle—training, awareness, organization and administration, documentation management, security of vital records, supplier performance, logistics, contracts and agreements, and the overall cycle's structure, content, and activity as well as success or failure of individual elements and the overall cycle.

At the end of the cycle, the test administrator has to verify that the current DRP contains all changes from the cycle and that it is ready for use in planning the next year's test cycle. The management summary must highlight changes due to lessons learned as well as areas where, in a real disaster, crises might have arisen. Management must know the criticality of making DRP part of every individual in the organization, and testing costs should be identified in tangible and hard numbers and budgeted for in the upcoming year.

Test plans must identify the type of disaster for the given scenario, extent of damage, staffing and equipment losses, backup options, recovery capability, and time/duration of the exercise. Responsible personnel should be identified, along with their particular roles. Tests should at first be only partial so that each part is known to be workable before the full test begins. After-hours or weekend testing may be desirable at first to minimize disruptions, but eventually no-notice testing becomes desirable if the organization wants to demonstrate readiness. New or relatively new plans should be tested every three or six months for the first year, followed by semi-annual tests or annual tests, depending on outcomes.

Testers should log events during the test so they can incorporate their findings in the results. Testing has to include feedback to the disaster recovery team about the state of their plan. The team, generally key managers, should evaluate the results and recommendations for change, so the test has to include elapsed times for each activity, amount of work performed, and accuracy of each activity. The plan should be changed based on the test results and become a more workable basis for a more realistic recovery. It should also be cost-effective and efficient, as it provides continual process improvement and better-prepared personnel. Effective testing should incorporate both scheduled and unscheduled testing of partial and total disasters.

For those companies unable or unwilling or unsure, there are contractors who will, for a fee, evaluate and improve the plan. Forsythe is typical in identifying gaps in the plan, such as insufficient recovery capabilities to meet the company's goals, and finding corrective actions. The result of the assessment and correction is that the company has a plan capable of mitigating threat impacts, perhaps preventing disasters altogether. Tests range from the simple to the extremely complex. Testing requires management backing, and it takes time to prepare and carry out a test. Also, tests take money. To work, they have to have a well-developed and structured process, and the process has to be followed from pre-test through the post-test assessments. To make testing more convenient, companies such as SearchDisaster Recovery.com offer templates and guides. The company promises its guide will teach how to conduct the test, whom to involve, and how to create an effective testing strategy. The template is free, and it contains sections on the concept of continuity testing, how to use the template, a glossary, and a section on effective testing strategies.

Conclusion

Beyond the formal cycle, additional testing is desirable. Orientation tests are the introduction; they require no prior experience, they orient new staff, they should occur monthly, and they should last 60 to 90 minutes. Drills test specific functions, need to be done realistically and test actual responses, involve all levels, occur once a month, and take 10 minutes to an hour.

Plans degrade over time because organizational evolution, incorporation of new products, and changes in policy and procedure produce a new environment that the old plan may no longer capture or measure. The plan has to remain current regarding hardware and software and other key equipment. And planners have to consider personnel turnover as well as forgetfulness or disinterest in the plan if it's left idle too long.

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See Also: Disaster Recovery; Simulations; Training.

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Disaster Risk Reduction

Over the last several years, disasters and their impact on lives, property, livelihoods, culture, and the environment have continued to increase. This includes both human-made and natural disasters.

One of the more commonly referred to definitions for disaster risk reduction is the one used by the United Nations agencies including the United Nations International Strategy for Disaster Reduction (UNISDR) and the United Nations Development Programme (UNDP): "The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development." It is the approach used to help limit disasters and keep their impacts from occurring. In short, disaster risk reduction includes the various actions related to reducing disaster-related risks and their adverse impacts through a systematic process of analyzing and managing the causes of events and what makes them disasters. This typically includes avoiding/preventing hazardous events from occurring as well as reducing the vulnerability of those exposed to these hazards and increasing preparedness and mitigation measures.

Disaster risk reduction has been gaining broader awareness and acceptance by international agencies, governments, disaster planners, and civil society organizations. This includes its importance as a tool for addressing disasters and development and humanitarian aid, as it is being understood that disasters do not need to occur as they have been, as events become disasters where people, property, heritage, and other elements are exposed to and vulnerable to these events.

One of the reasons that increased attention to disaster risk reduction is being recognized as a means to minimize disasters goes back to the United Nations World Conference on Disaster Reduction (WCDR) held in 2005 in Kobe, Japan, just days following the 2004 Indian Ocean earthquake. At this conference, it was seen that disaster risk reduction was needed, but it was also seen that a strategic framework for implementing disaster risk reduction projects needed to be defined to push international organizations as well as national governments beyond the inexplicit rhetoric typical of most policy statements and toward establishing defined targets and commitments to address disaster risk reduction. The first part of this process was the formal approval at this conference of the Hyogo Framework for Action. This has become the first internationally accepted framework for disaster risk reduction that has been accepted on an international basis and has continued its implementation over the last several years. The Hyogo Framework sets out various objectives (outcome, strategic goals, priorities, etc.). It contains five priorities for actions in order to address the main components needed for disaster risk reduction and is developed in a way that accounts for social, environmental, and economic context from local levels up to national and global levels. These components include the following:

- Making disaster risk reduction a national and local priority and having a strong institutional basis for its implementation,
- Improving risk information and early warning,
- Building a culture of safety and resilience,

- Reducing the risks in key sectors, and
- Strengthening preparedness for response.

Disaster Risk Reduction Planning

There are several steps in the process of developing disaster risk reduction plans. Typically, they include the following:

- Gathering information and data
- Establishing objectives
- Identifying performance criteria
- Understanding hazards
- Developing disaster risk reduction alternatives
- Evaluating and selecting disaster risk reduction options
- Documentation of the disaster risk reduction plan
- Implementation of the disaster risk reduction plan
- Ongoing reviews and updates

Development of Risk Reduction Plans

There are nine phases in the development of disaster risk reduction planning: (1) gathering information and data, (2) establishing objectives, (3) identifying performance criteria, (4) understanding hazards, (5) developing disaster risk reduction alternatives, (6) evaluating and selecting disaster risk reduction alternatives, (7) documentation of the disaster risk reduction plan, (8) implementation of disaster risk reduction alternatives, and (9) updating the plan.

Phase 1: Gathering information and data. The development of disaster risk reduction plans typically begins with gathering information related to the people, location, hazards, vulnerabilities, and project. Information that can help with the establishment of the overall context of the disaster risk reduction assessment may include some of the following:

- Stakeholders involved
- Culture/social environment
- Hazards
- Vulnerabilities
- Regulatory environment
- Overall resources: personnel, capital
- Emergency response characteristics
- Operational/functional characteristics
- Schedule

Phase 2: Establishing objectives. The overall objectives should then be defined. These typically reflect the common goal or mission of the various stakeholders involved from top to bottom, as each stakeholder likely possesses different objectives. Objectives can be defined in a number of ways, depending on the intention of the disaster risk reduction assessment and what the prevention and mitigation measures are supposed to accomplish. Disaster risk reduction objectives may relate to further understanding how various entities may be impacted by a disaster. These, for instance, may be further broken down into people (public, emergency response teams); property (site, contents, structure, collections, etc.); continuity of business operations and limiting downtime; protecting cultural heritage; and limiting the impact to the environment before, during, and after the event. When defining these objectives, one can also define objectives as to how management, mitigation, and prevention measures can be implemented, for instance, limiting the aesthetic impact to a historic structure from seismic bracing, or the installation of fire protection systems.

Objectives are likely not going to be the same for everyone. They need to be developed and fit to each situation in a tailored manner and independent from what may have been done or what worked for other assessments.

One should be cognizant of the potential for competing objectives; objectives for a given situation may compete with each other. These should be appropriately assessed. This may occur, for instance, with security-related and life safety–related matters. For life safety, one needs to try to contain heat and smoke while at the same time enabling occupants to exit and emergency responders to enter; simultaneously, security objectives are looking to limit access to a building and may even block exits with security equipment (turnstiles, scanning machines, etc.) at entrances and exits.

Phase 3: Identifying performance criteria. Once the stakeholders' objectives are established, then they can be transformed into the more quantitative performance criteria. Performance criteria are thus the "metrics" that need to be developed so one can more quantitatively assess the objectives against potential events and hazards.

In light of this, performance criteria can therefore be defined by means that can be directly calculated or measured. As an example, for a stock trading company this could be stated in terms of maximum allowable downtime. For other types of hazards, performance criteria could be developed in terms of the highest potential flood level.

Phase 4: Understanding hazards. There can be numerous potential events or hazards that exist that could lead to a disaster that a disaster risk reduction plan is to address. There are numerous hazard identification techniques to help one condense the larger set of scenarios from "possible" to "credible" scenarios. This smaller subset would represent more of a primary concern and higher probability, and the hazards that need to be further assessed.

Following the identification of hazards, possible scenarios need to be further developed and defined. These hazard scenarios provide additional information and quantification of specific hazards so that they can be further assessed. In the case of fire, for instance, a scenario may go further by quantifying and detailing the characteristics of ignition, growth of the fire and spread to other objects, reaching a peak heat release rate, the duration of a steady burning period, and then the characterization of the decay, and eventual suppression of the fire.

Phase 5: Developing disaster risk reduction alternatives. Once the hazard scenarios have been developed, then disaster risk reduction alternatives should be identified and developed to mitigate these risks. Disaster risk reduction alternatives may include prevention measures, mitigation and physical protection measures, and regulatory requirements that impact codes of construction or use of lands or construction techniques. These alternatives are often intended to help reduce the physical vulnerability and/or exposure to the particular hazard. For instance, they may include measures related to infrastructure (such as dykes to prevent floods).

There are numerous options available for reducing risks. However, it is important to be cognizant of the previously established objectives. Additionally, one may undertake risk assessments that are intended to help stakeholders make informed decisions as to which specific alternatives would be anticipated to achieve these objectives.

The stakeholders may need to further assess the mitigation measures against the impacts they entail—such as their costs and impact on other elements (such as environmental impacts), as well as what resources are needed and whether it is a long-term sustainable solution—in order to inform decisions as to what is to be done to develop an appropriate path forward. A cost-benefit analysis is often quite useful in assisting with this part of the assessment.

Phase 6: Evaluating and selecting disaster risk reduction alternatives. Following the development of various disaster risk reduction alternatives, it is then necessary to evaluate these alternatives to see whether each appropriately addresses the previously established objectives and performance criteria. The assessment can be a qualitative assessment and/or consist of more detailed quantitative evaluations to help determine the event's probabilities. These assessments can also help gain a further understanding as to the potential damage that may occur.

There are a number of different tools and methods available to assess these. These often range from more simplistic "back-of-the-envelope" calculations through much more complex computer analyses. This may also include assessing historic events or conducting detailed probabilistic studies, including event trees, fault trees, HAZOPS, and numerous other types of hazard and risk assessment tools. Following the assessment of these and a determination of which may meet and not meet the previously selected performance criteria, appropriate alternatives can be chosen for implementation. It is important for the stakeholders to remember that this process is an iterative one and that there may be several disaster-related prevention and mitigation options that need to be assessed against the various events and hazards and the performance criteria. After the analyses are finished, stakeholders have the ability to make more appropriate and risk-informed decisions.

Phase 7: Documentation of the disaster risk reduction plan. Documentation of the process and the results of each task, what led to the chosen alternatives, and how each is to be implemented is a key part of the process. This phase assists in further understanding among the stakeholders as to how the assessment was carried out and documents it for inquiries later and for future developments, as this process is an iterative one, as previously noted. The various assumptions and processes at this time need to be clearly defined, as well as the objectives, vulnerabilities, and hazards. The uncertainties and variability surrounding these assumptions should also be further documented.

Phase 8: Implementation of disaster risk reduction alternatives. A strategy for the chosen alternative starts in part with the plan for implementation of the disaster risk reduction measures and prevention strategy. This implementation strategy needs to include details such as prevention measures, mitigation measures, costs, schedule, and priorities. For example, the basic concepts of prevention strategy may include limiting the hazard from occurring and implementing mitigation measures. For instance, for fire, limiting the hazard would include such concepts as limiting ignition sources by checking electrical wiring, separating combustible materials from ignition sources, frequently removing rubbish, testing and maintaining fire safety systems, keeping procedures for operations such as hot works, and training in fire safety and evacuation. Mitigation measures, on the other hand, may include egress systems, detection and alarm systems, automatic suppression systems, compartmenting of the building to limit fire and smoke spread, installation of equipment for firefighting operations, and protection of the structure to limit premature collapse.

Phase 9: Updating the plan. Noted above was the concept that this approach is an iterative one and is continually ongoing and in need of review and updating as necessary. Thus, it is important to create awareness about the plan; provide appropriate training to the various stakeholders, particularly those working on-site; and also establish ongoing assessments so that new hazards, vulnerabilities, and risks are not introduced or created, and that appropriate disaster-related prevention measures and mitigation measures are in place and properly maintained so that they function appropriately as needed.

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See Also: Emergency Responders; Prevention; Risk Analysis.

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Disruption of Organizations

Social organizations cannot function as expected if they are disrupted by crises or disasters. Personnel loss and facilities damage are two common features of organizational disruption. Once a disaster happens, structure and tasks can be two dimensions of understanding the organizational change.

Disruption of Public Organizations

The reason people care about "disasters" is often not because of the hazard agent itself but because of its social disruption dimension. As E. L. Quarantelli, one of the pioneers in disaster research, posited, "a disaster can be identified only in terms of some features of a social occasion, that is, some characteristics of the individuals and groups acting in the situation." Because organization is the basic unit of society, the understanding of organizations' disruption is critical for comprehending the nature of crisis and disaster. Disruption of organizations means that organizations are broken apart or their normal functions are interrupted and cannot operate normally.

In most countries, government agencies or the public sector are the main first responders during major crises. The local community disruptions would restrain the efficiency and effectiveness of quick response. Personnel loss and facilities damage are the most significant disruptions for local government. For example, in the case of the 2008 earthquake in Wenchuan, China, many local government agencies experienced a severe loss of personnel. In Beichuan, one of the most damaged counties, about 20 percent of local officials died in the earthquake. Some agencies, such as the Civil Affair Department and Bureau of Education, lost almost half of their staffs. A similar situation was also observed in the 2011 Tohoku Great Japan Earthquake and Tsunami. The tsunami killed many local community leaders and destroyed government buildings. The town of Otsuchi lost its mayor, seven senior staff, and 31 other municipal employees in the tsunami. In Minamisanriku, the tsunami wave overtopped the community's emergency operation and tsunami warning center while local officials were broadcasting evacuation orders there, and in the end, only 10 staff members survived. The worst case in recent years may be the 2010 Haiti earthquake. Most of Port-au-Prince's municipal buildings, including City Hall, were destroyed. Also, many national public buildings, such as National Palace, the National Assembly, and the Supreme Court, collapsed. Even the headquarters of the United Nations Stabilization Mission in Haiti and offices of the World Bank were totally destroyed. Without enough staff and necessary facilities, neither the local jurisdictions nor the national government were able to respond to the tragedy quickly and effectively.

Even though the public sector could experience a lack of personnel in emergency response, worry about role abandonment or role conflict is not necessary.

"Role abandonment" means emergency first responders would abandon their role as public officials during a crisis, and "role conflict" refers to the conflict between their public roles (such as firefighter) and their private roles (such as husband or father). Behavioral studies after disasters in the last 50 years indicate that the role abandonment phenomenon is rare, but it does happen in some cases, such as Hurricane Katrina. Perception studies that ask people how they might react in hypothetical scenarios tend to conclude that widespread role abandonment will occur, especially in some pandemic situations.

Disruption of Business Organizations

Business organizations are essential for community functioning because they provide products/services, employment opportunities, and taxes. Business organizations would also be devastated during crisis and disaster. For example, in Santa Cruz, California, it was estimated that about 60 percent of the downtown businesses were destroyed or sufficiently damaged to require at least temporary closure due to the devastating Loma Prieta earthquake on October 17, 1989. Also, during the 1993 midwest floods, about 41 percent of the business organizations in Des Moines/Polk County were forced to close for some period of time. Prior studies point out that the lifeline services, especially electrical and telephone services, are key determinants of business continuity. Without electricity service, most companies would have to close immediately; without phone or telecommunications service, they could last for only about half a day.

Conceptualization of Organizational Change

Disaster research pioneers E. Quarantelli and Russell Dynes developed the Disaster Research Center (DRC) typology in the early 1970s to help people understand the organizational response to disasters. This typology is a simple fourfold property space that classifies organizations responding to disaster along two dimensions: tasks and structure. Structure is categorized as old and new, and tasks are characterized as either regular or nonregular, resulting in four types of organized responses to disasters (Table 1).

Table 1 Disaster Research Center typology: types of organized behavior in disasters

		Tasks	
		Regular	**Nonregular**
Structure	**Old**	Type I: Established	Type III: Extending
	New	Type II: Expanding	Type IV: Emergent

The established organizations carry out regular tasks and rely on existing structures during the time of disaster. These organizations, like the police and fire departments, are familiar with emergency response and may have the least disruptions from disasters. The expanding organizations, such as American Red Cross or Salvation Army chapters, are another kind of organization involved in disaster response. They carry out regular tasks but extend their structures to disaster-affected areas with formally trained personnel. Type III is the extending organization, which takes on nonregular tasks with the old structure. These organizations are not expected to take a role in disaster response, but they do perform nonregular tasks during crisis. For example, Walmart helped deliver mass-care materials using its logistics system during Hurricane Katrina. The last type is the emergent organization evolving into a new structure and obviously nonregular tasks. Most of these organizations do not exist before the disaster event they are formed during or after emergencies to fill emerged needs.

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See Also: Business Continuity Management; Business Continuity Planning; Coping Capacity and Response Capability; Crisis Communications; High Reliability Organization Theory; Organizational Failure.

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Doctors Without Borders

Crises occur across the globe and often without warning. Humanitarian organizations dispatch relief personnel to provide food and to conduct rescue operations after these crises have occurred. Physicians, nurses, and allied health professionals are often called upon to respond to these crises. Journalists are often on the scene to report information about the crisis to the general public. In 1971, a group of physicians and journalists in France formed Médecins Sans Frontières (MSF), or Doctors Without Borders, in an effort to respond to a variety of crises across the globe. The organization operates as an independent group and is supported with donations and volunteer personnel; it is not connected to any government agency. Doctors Without Borders responds to calls for assistance during natural, human-caused, and technological crises. These include floods, earthquakes, tsunamis, cyclones, and famine, much of which is caused by acts of armed conflict. Medical care and pharmacy services are provided for epidemics such as cholera, tuberculosis, influenza, malaria, and tetanus. Although Doctors Without Borders maintains neutrality, it often works to bring attention to the plight of those affected by crisis. This may involve bringing attention to areas facing famine, armed conflict, or the forced relocation of ethnic populations without a country or region.

Organization

The primary organization maintains support offices in over 60 countries and partners with 19 associative organizations, allowing for global coverage. Each country is divided into field offices comprising over 22,000 administrative

A malnourished child waits in a Doctors Without Borders treatment tent in the Dolo Ado camp, near Ethiopia's border with Somalia, July 2011. The United Nations declared a famine in five regions of Somalia by early August. By December, "Malnutrition rates are still very high; this is still an emergency situation," said Voitek Asztabski, emergency coordinator for Doctors Without Borders in the camp. Over 50 percent of children in the camp were suffering from malnutrition at that time, according to the United Nations.

and medical staff. This includes physicians, nurses, radiological technicians, laboratory technicians, surgeons, and mental health professionals. Supportive care is provided by logisticians, water and wastewater treatment engineers, and communications personnel. Epidemiologists, chemists, and pharmacists provide medical care, pharmacy services, and specialized medications in areas affected by epidemics such as human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS), malaria, tuberculosis, cholera, or similar outbreaks. Each site is managed by volunteer administrators who are charged with ensuring that all services run smoothly. Doctors Without Borders works with local physicians and hospitals in order to enhance the quality of medical care instead of trying to replace it. This method increases the likelihood that local agencies will work with the organization to provide the best medical care possible.

Team Medical Equipment

Doctors Without Borders responds to crises using the latest, most advanced medical equipment available. The majority of the medical equipment is designed to be used in the field environment, making it fully transportable and easily moved. This is especially important in areas of armed conflict because the team may be required to quickly relocate in order to protect staff, patients, and equipment. The organization has the ability to provide medical care in mobile sites, temporary sites, and fixed locations such as former hospitals. Equipment includes radiological equipment to conduct X-rays, exam areas, emergency triage and treatment equipment, specialized surgical equipment, laboratory equipment, and mobile pharmacies. Moreover, each site is fully self-supportive with both water filtration equipment and wastewater treatment facilities. Comfort care is provided in the form of free blankets, pillows, and clothing.

Epidemics

Epidemiologists typically work with local public health officials in underdeveloped countries to identify and understand disease outbreaks and provide the most advanced treatments available. The goal is to totally stop these disease outbreaks or reduce them as much as possible. Over 1 million patients received medical care and drugs in 2010. Moreover, Doctors Without Borders vaccinated just under 8 million persons for meningitis globally in an effort to prevent infection from the disease. This has resulted in millions of lives being saved.

Response During Armed Conflict

Armed conflict continues to grow around the world, especially in the Middle East and parts of Africa. Doctors Without Borders provides medical care in these areas without choosing sides. An independent, neutral voice allows the organization to enter countries or areas of conflict whenever other organizations are not allowed to enter. Organizations such as the United Nations, the Red Cross, or the Red Crescent are often prohibited from entering these regions because of their connection to foreign nations including the United States. Because Doctors Without Borders serves as an independent, nonreligious group, many countries do allow them to provide medical care and feeding services, whereas others are not allowed to. Acute and chronic medical care is provided, including wound treatment, prosthetics, and long-term medication. This is especially important in conflict-torn countries where both women and children are often the last to receive any medical care. Doctors Without Borders provides both specialized wound treatment and prosthetics in an effort to make life more bearable. Patients in these war-torn areas are often able to return to a normal, productive life by supporting their families with daily tasks such as the gathering of food at the market, farming, or working outside jobs in the community.

Partnerships

Doctors Without Borders partners with governments as well as the private sector in an effort to gain access to hard-to-reach areas. These groups assist with logistics, transportation assets, communication, and medical care. Site security is also a major consideration, so local governments partner to provide these services. Additional partnerships with major food providers allow Doctors Without Borders to provide high-quality, low-cost meals to those facing starvation. Similar partnerships allow the organization to respond to major crises throughout the world. Agreements with other nonprofit organizations such as Feed the Children and Child Reach International not only reduce costs but also allow for the placement of additional volunteers in these crisis-stricken regions.

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See Also: Cholera; Crisis, Definition of; Emergency Medicine; Epidemics; Health and Medical Response Scenarios; HIV/AIDS Epidemic; Famine; Infectious Disease; Measles; Poverty; Refugees and Forced Migration; Risk Treatment; Tuberculosis; Uncertainty; Vaccinations; Volunteer Coordination; Vulnerable Populations; War Crimes.

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Documentation

Documentation is a critical component of effective crisis management. Many private, nongovernmental, and governmental organizations already have standard processes in place to ensure thorough documentation for each component of crisis response and management. Such documentation is important for organizations to demonstrate the steps taken in response to an emergency, disaster, or crisis. These efforts are valuable, not only because they help avoid duplicated efforts or problems with the allocation of resources, but also because such documentation ensures the existence of evidence of what was done should problems arise. The specific documentation or paperwork required by different organizations may vary, but there are a few commonalities, such as documentation of insurance policies and ownership, resource and aid distribution, and the identification and tracking of personnel. Most organizations have requirements in place for crisis management and disaster or emergency response plans to exist prior to an event occurring, as well as specific requirements for documentation that fills particular needs about recording what, when, where, why, and how events took place and who was involved.

Before, During, and After a Crisis

Documentation accumulated before, during, and after an emergency, crisis, or disaster not only helps crisis management deal with the problems raised by that particular event but also helps people to understand the actions that should potentially be taken to respond to future events. Such documentation about preparations for crises, active management during crises, and responses after crises are all essential to good crisis management for ongoing and future events. By keeping clear records of crisis management, individuals involved can ensure that proper steps are taken to prepare for and respond to events in progress, as well as to prepare for and prevent errors in future events.

Some of the documentation that is important for emergencies, crises, and disasters must be developed before an event occurs. Business continuity plans and specific plans for crisis response and management, such as evacuation plans and risk assessments, need to be developed before a crisis happens so that each individual involved knows his or her responsibilities. Having insurance policies in place and up to date before a crisis means recovery can begin more quickly and likely run more smoothly after a crisis. Knowing where financial statements or deeds and ownership papers are before a crisis means that they can be transported safely if evacuation is necessary and accessed quickly as needed.

To maintain communications between employees, organizations often also include contact sheets in their disaster, emergency, and crisis plans. The development of these documents helps create plans to manage crises before they occur, allowing people and groups to be better prepared for such events, and to respond to them more effectively. Documents developed before a crisis should clearly lay out the steps that need to be taken, including what each person involved should be doing to prepare for and respond to a crisis, and clearly identify responsibilities in time of crisis.

During a crisis, ongoing documentation of steps that have been taken and plans that have been made is critical, ensuring that what is needed and what has been done are known to everyone involved. For example, incident report sheets are often used to record information during a crisis. This paperwork is crucial to recording and understanding how the crisis developed, progressed, and was resolved. These records include notes about what steps were taken, who was involved in various decisions and actions, and the end result of these actions. While a crisis is progressing, documentation should include notes not only about steps taken within an organization but also information that has been given to outside groups. It also needs to include what the media has been told and how they have spread that information to the public.

After the crisis occurs, documentation often includes recording the effects of the emergency, crisis, or disaster, such as physical damage done to structures (through written reports or photographs); response efforts during immediate relief operations, such as resources distributed to people affected; and steps taken during longer-term recovery efforts, such as payment of reconstruction expenses. Initial documentation of the damage should happen before repair work begins, although this can wait until after emergency search-and-rescue efforts. Documentation of this work includes a variety of information, such as who was involved, what happened, where it happened, when it happened, why certain steps were taken, and how the process occurred, as well as details describing the situation to make the reasons for these actions clear, if necessary.

In addition to being important for governmental and private organization crisis management, documentation is also important for individuals affected by disasters and allows people in charge of recovery and assistance to better help them. This documentation is up to the individual, family, or group to assemble and maintain, but education by organizations about what kind of documentation disaster-affected individuals need can occur before an emergency, crisis, or disaster. It will help ensure that affected individuals are able to provide necessary documentation and that they receive appropriate aid. The personal documentation that individuals should be encouraged to evacuate with and maintain includes items such as identification, birth and marriage certificates, deeds, medical records, and insurance documents. While the crisis is ongoing, individuals should keep records of costs related to evacuation and reconstruction for potential reimbursement.

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See Also: Bureaucracy; Crisis Communications; Incident Action Plans; Strategic Plans; Vital Records.

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Downtime

Downtime is a term that refers to a period of time when functions, systems, or personnel are unavailable. Downtime may be a planned or unplanned suspension of operation typically experienced in areas of technology, industry, and human capital. There are numerous possible causes of downtime and the possibility of significant impacts to businesses, government, and society. Emergency planning efforts include addressing downtime during all phases of emergency management.

The opposite of the term *downtime* is *uptime*. *Uptime* is a term describing the measurement of the length of time a system, machine, or process has been active without experiencing any downtime. During uptime, all critical components of a system are functioning without deficiency. Recovery from downtime can be considered the resumption of uptime.

Planned or Unplanned Downtime

Periods of downtime are often planned as part of a system maintenance schedule or update. This time may also include periods when a system is inactive, or idle, on purpose. Planned downtime is often scheduled during a maintenance window when the impact is negligible or minimal. Planned downtime may also be called voluntary downtime.

Although crises can occur from planned downtime, they are more likely to be a result of unplanned downtime. Unplanned downtime may occur because of human error, equipment or utility failure, or overloading. These periods of time may also be referred to as involuntary downtime. Some entities recognize semi-planned downtime, which the organization itself has not planned but another organization has. For example, a vendor may plan downtime to upgrade software for an organization but neglect to inform the user.

Areas of Downtime and Causation

Downtime is a term used mainly to describe systems of technology, industry, and human capital. Technological downtime is commonly understood to impact networks, servers, and communication systems. Technology seeks to eliminate downtime by providing systems of high availability and fault tolerance. Technological downtime may be caused by utility disruption, software error, hardware, interconnectivity, transmission issues, system limits, or procedural error. The causations of downtime are numerous and complex, but important to the quick resumption of operation.

Industrial downtime is the unproductive blocks of time when functional operation ceases. Many of these are planned downtime for maintenance. However, factories and mechanical production systems experience unplanned downtime resulting from mechanical problems and lack of resources. Disruption in utilities, damage, failure, design, overload, and unknown reasons can also cause unplanned downtime.

Human capital downtime describes time when employees are unable to perform their regular work because of another limitation, including meetings, illness, and strikes. The lack of personnel may be the cause of human capital downtime as well. One area of downtime can cause another system to fail; for example, the downtime experienced in human capital can cause downtime in industrial production or technology. Downtime can also refer to the time when public servants are not actively responding to citizens' calls.

The occurrence of downtime may itself be a crisis event. For example, downtime in technology industries can be an event. Downtime can also cause a crisis event, for example, loss of critical infrastructure. A metropolitan area without power may start a cascading event. Or downtime can occur as a result of another crisis event, such as a natural disaster. Downtime is a roadblock to recovery during disasters, regardless of the reason for its occurrence.

The Impact of Downtime

The impact of downtime depends on a number of factors, particularly the system(s) impacted, time of occurrence, duration, and cause. The composition and significance of the system that is inoperable determines much of the impact of downtime. The greater the size, complexity, criticality, and interdependency of a system, the greater the resulting impact. The time of occurrence of downtime affects the impact, since many systems have periods of variable operation. Any downtime during peak use results in more serious impact. An increase in the duration of any downtime typically increases the overall impact. Finally, the cause of the system failure influences the degree of impact and damage caused during downtime.

These factors determine the scope and the intensity of damage. Downtime is measured as a period of time without operation, loss of uptime, and monetary loss. The impact of downtime can range from negligible to catastrophic. Produced goods have the cost of planned downtime built into the sales revenue; however, unplanned downtime results in increased costs. Industries that rely on 24-hour service or e-commerce typically experience greater loss. Downtime can cause businesses to lose customers and revenue or default on contracts. Other impacts of downtime can include intense emotional reactions to downtime by both internal personnel and external customers. The brand images of a business may be impacted significantly and result in loss of revenue. Finally, the impact includes the cost of recovery—getting the system operational again. Governmental agencies experiencing downtime and seeking to continue operations will be impacted.

Downtime Preparedness and Mitigation

As our world systems and environments continue to expand in complexity, thereby increasing the possible consequences of downtime, the importance of preparedness and mitigation continues to multiply. Downtime can be avoided by identifying and eliminating downtime triggers. Systems should be built with redundancy to avoid the occurrence of downtime. Alternative processes and systems may be in place to enable critical operations to continue during downtime. The risk can be minimized by maintaining the system, using reliable components or technical codes that can check sums or detect error. The early detection and notification of downtime can reduce the duration and therefore the impact of downtime. Contingency and business continuity plans address downtime. Recovery plans include downtime duration reduction and recovery planning.

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Strategic Business Resiliency

See Also: Backup Strategy; Business Impact Analysis; Business Resumption Planning; Critical Infrastructure; Cyber Security; Data Recovery; Failover; Maximum Acceptable Outage; Strikes.

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Drought

Drought is a slow-onset natural hazard characterized by an extended period of deficiency in precipitation in a region. Drought disaster is the natural disaster with the largest number of causalities. The frequencies as well as the intensities of droughts are increased by global climate change and population growth. However, droughts do not necessarily lead to a disaster. A drought disaster is not only caused by the occurrence of deficits in precipitation but also by the interrelation of the climate hazard and a social vulnerability. Precipitation itself can hardly be influenced since the effect of artificial techniques of inducing rainfall is still controversial. Therefore, the economic, social, and political characteristics that render livelihoods of drought-prone populations are the crucial factors that determine the extent of drought disasters. People's vulnerability to drought is determined by the way their livelihoods are influenced by the water deficits of a drought, their coping capacities, their resilience, and their assets.

Drought Definitions

There is no universally accepted definition of drought because many disciplinary perspectives of drought exist. Each discipline incorporates different physical, biological, and/or socioeconomic factors in its definition. A broad definition of drought is a deficiency of precipitation over an extended period of time, usually a season or more, which results in a water shortage for some activity, group, or economic sector. Droughts are classified as meteorological, agricultural, hydrological, or socioeconomic.

Meteorological drought is usually defined by a certain precipitation deficiency over a period of time. The thresholds chosen, such as 50 percent of normal precipitation over a six-month time period, vary by location and according to applications. Hence, most meteorological drought definitions relate actual precipitation departures to long-term average amounts. Meteorological droughts are a normal, recurring feature of climate and occur in virtually all climatic regimes. Meteorological drought definitions solely look at the water supply side.

Hydrological drought is defined by deficiencies in surface and subsurface water bodies, relative to average conditions. There is no direct relationship between precipitation amounts and the status of surface and subsurface water supplies in streams, lakes, reservoirs, and aquifers, because the hydrological system components often are used for irrigation, water supply, hydroelectric power production, canals, and flood control.

Agricultural drought links various characteristics of meteorological drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, and soil water deficits. A plant's demand for water is dependent on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil. Agricultural drought is defined by the lack of availability of soil water to support crop and forage growth. This lack is also influenced by infiltration rates and the water-holding capacity of soil. During drought onset, agriculture is usually the first sector to experience drought because soil moisture will normally be the first component of the hydrological system to be affected. Drought events can disrupt food production systems and can be a significant natural trigger for famine.

Socioeconomic drought differs from the other types of drought in that it reflects the relationship between the supply and demand for some commodity or economic good that is dependent on precipitation, such as agricultural goods, livestock forage, drinking water, or hydroelectric power.

Drought must be distinguished from aridity. Aridity refers to a permanent climatic condition of very low annual or seasonal rainfall. Moreover, drought is different from desertification. Desertification is used to indicate a long-term and irreversible process of decrease or destruction of biological soil potential. Nevertheless, drought might accelerate the process of desertification.

Drought Assessment and Management

Measures of drought disaster risk management that are targeted at the livelihood security of drought-affected people can prevent a period of water scarcity from leading to a drought disaster. Although drought vulnerability is not equal to poverty, drought—more than any other natural disaster—in particular affects people with low incomes.

Drought disaster risk management focuses on preventing or minimizing negative effects of droughts. Because the pure drought hazard is almost impossible to influence, measures of drought disaster risk reduction are targeting the vulnerabilities of people to drought. Crucial for minimizing vulnerabilities and strengthening capabilities as well as resilience is a comprehensive understanding of the complex structure and spatial distribution of social vulnerability. This is the core aim of a drought risk analysis. Drought vulnerability is spatially variable, and vulnerable groups are dispersed over space. Various drought risk analyses clearly show that the scope of disparities in drought vulnerability is reaching down to the micro level of households. The drought risk can vary significantly among households and depends on livelihoods, class, gender, age, location, social networks, assets, and other particular conditions shaped by economic, social, and political processes.

The quantification of impacts and the provision of disaster relief are far more difficult tasks for drought than they are for any other natural hazard because drought seldom manifests in visible structural damage. Drought-prone regions should conduct risk assessments to identify the factors and processes leading to drought risk and determine who and what is most at risk to drought. A drought vulnerability profile is an invaluable tool for assessing drought risk and should be completed as part of drought preparedness planning in order to systematically address the most vulnerable people. The risk associated with drought for any region or group is a product of the exposure to the natural drought hazard and the vulnerability of the society to drought. A drought risk assessment is the basis for the identification of suitable measures to reduce the drought risk.

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See Also: Disaster Assessment; Disaster Risk Reduction; EM-DAT; Food Security; Hazard Vulnerability Analysis; Prevention; Refugees and Forced Migration; Resiliency; Risk Analysis; Risk Assessment; Vulnerability; Vulnerable Populations.

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Drug Resistance

Drug resistance refers to the ability of a microorganism, such as a bacterium, virus, fungus, or parasite, to resist an antimicrobial medicine that had previously been effective against it. Drug resistance develops as a result of the use of antimicrobials and can be accelerated by the improper use of antimicrobials, such as failing to complete a prescribed course of treatment or the use of antimicrobials against diseases for which they are known to be ineffective (for example, using antibiotics to treat a virus).

Antimicrobial resistance threatens to reverse the gains made by medicine against infectious disease in the last 60 years and is an international problem that can threaten the lives of patients, hamper the control of infectious disease, and increase health care costs. In addition, as the result of modern means of transportation and the ability of people to move all over the world, antimicrobial resistance is not a problem that can be contained in any one country; instead, movement of an infected person can easily spread drug-resistant microbes from one country to another.

Causes of Drug Resistance

Bacteria, viruses, parasites, and other microbes are living organizations that mutate rapidly and evolve over time; the process of natural selection ensures that the microbes that are best adapted to their environment will survive, and those that are resistant to available antibiotics are thus favored for survival. This evolution is a normal process of nature but becomes a matter of concern in terms of medicine because this process of evolution helps create microbes that are resistant to medicines effectively used against them in the past. Consider the example of a person with a bacterial infection who takes a prescribed antibiotic to combat the infection. Some bacteria will be quickly killed by the antibiotic, but others may have mutated and are resistant to it (that is, the antibiotic does not kill them, or kills them more slowly). If those bacteria survive the antibiotic treatment, they will reproduce and very likely pass the mutation on to their descendants, and in this way a large population of antibiotic-resistant bacteria may be created. When these bacteria infect a new person, existing antibiotics may not be effective in treating this patient, who may suffer serious illness or die as a result.

One of the great success stories of modern medicine is the development of antibiotics such as penicillin, sulfa drugs, and tetracycline to combat common infectious diseases. In the mid-20th century, many believed that modern medicine had conquered formerly dreaded diseases such as tuberculosis and pneumonia, while also bringing common infections such as strep throat and ear infections readily under control. However, as a result of the normal course of evolution, as the use of antimicrobials increased, so did the emergence of strains of resistant microbes. Originally, this was less of a problem because numerous types of antimicrobial drugs were available to treat infections, and if one was no longer effective, a different drug could be substituted. However, continued use and abuse of antibiotics has created a situation in which common bacteria are resistant to numerous drugs, complicating the process of treating patients.

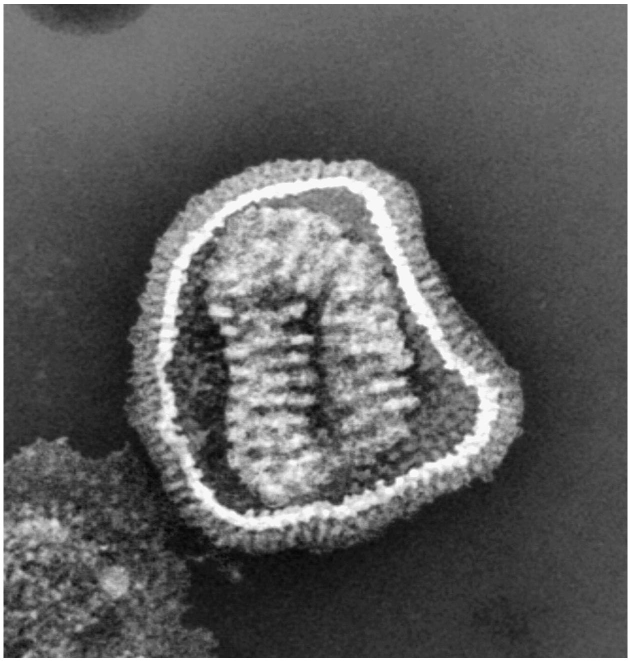
The evolution of drug-resistant bacteria is a natural process, but some behaviors encourage that process. One is failing to complete a prescribed course of antibiotics; this behavior allows bacteria that are resistant to the treatment to survive and multiply. Another is the overuse and inappropriate use of antibiotics; even appropriate use of antibiotics aids the process of breeding drug-resistant bacteria, but overuse and inappropriate use encourages this process without providing any benefit to the patient. Some researchers also believe that widespread use of antibiotics in agriculture (for instance, adding antibiotics to animal feed) also encourages the growth of resistant microbes that can infect humans.

Specific Diseases

Tuberculosis (TB), a disease that once seemed to be nearly conquered by antibiotics, has become a health threat once again because of the emergence of drug-resistant strains of TB. Multidrug-resistant TB (MDR-TB) refers to resistance to the most commonly used (first-line) TB drugs, rifampicin and isoniazid. It can be treated with other drugs, but it has difficulties, including the need for a longer course of treatment and the fact that the less common drugs are generally more expensive and have more side effects than the first-line drugs. The World Health Organization (WHO) estimates that about 440,000 new cases of MDR-TB occur each year, and that at least 150,000 deaths annually are caused by MDR-TB. An even more serious concern is extensively drug-resistant tuberculosis (XDR-TB), which is resistant not only to the first-line drugs but also to any fluoroquinolone and to at least one of capreomycin, kanamycin, and amikacin. According to the WHO, extensively drug-resistant tuberculosis had been reported in 64 countries as of 2012.

Staphylococcus aureus (staph) is a common type of bacteria often found on people's skin and in their noses; however, staph can also cause illnesses ranging from boils and pimples to meningitis and sepsis. When penicillin was first introduced, it was highly effective against staph infection, but today many strains of staph are resistant to penicillin. Other drugs effective against staph have been developed, but a particularly dangerous strain known as methicillin-resistant *Staphylococcus aureus* (MRSA) has become increasingly common and has been particularly identified as responsible for many hospital-acquired infections. The WHO estimates that worldwide, a high percentage of infections acquired within hospitals are caused by drug-resistant organisms such as MRSA and vancomycin-resistant *Enterococci*. In the United States, the Centers for Disease Control and Prevention (CDC) estimate that the proportion of health care-related staph infections related to MRSA increased rapidly from the 1970s to the early 21st century; in 1974, 2 percent of staph infections in intensive care units were caused by MRSA, and this proportion grew to 22 percent in 1995 and 64 percent in 2004. However, increased attention to infection control has caused the number of MRSA infections to decline since then; for instance, a 34 percent decrease in MRSA infections in hospitalized patients was observed between 2005 and 2008.

Shigellosis is an infectious disease characterized by severe and often bloody diarrhea, high fever, and cramping; it is caused by the *Shigella* bacteria. The WHO estimates that shigellosis causes over 120 million cases of severe dysentery each year, primarily in developing countries and in children under five years of age; about 1.1 million people die annually from shigellosis, about 60 percent of whom are children younger than five. Antibiotic-resistant strains of shigellosis are a matter of increasing concern in countries where the disease is common. For instance, a WHO study in several Asian countries in 2000–04 found that a majority of *Shigella* isolates were resistant to cotrimoxazole and amoxicillin, and a 2005 study reported that 95 percent of the isolates of two major strains of *Shigella*, *S. sonnei* and *S. flexneri*, were resistant to tetracycline and cotrimoxazole, and 95 percent of the *S. flexneri* isolates were also resistant to tetracycline and chloramphenicol. The WHO currently recommends only ciprofloxacin for treatment of shigellosis, because of increasing resistance to other antibiotics, but ciprofloxacin resistance is also becoming a problem.



An influenza virus particle. Widespread use of a single medicine could generate a drug-resistant strain of the H1N1 flu virus, but one study has indicated that using a second drug during the early phase of a local epidemic could significantly delay resistance.

Malaria is caused by infection with a parasite transmitted from person to person through the bite of an anopheles mosquito; symptoms include fever and chills, anemia, and flu-like symptoms. Malaria remains a major health threat in many tropical countries; the CDC estimates that 300–500 million cases occur each year, and over 1 million people annually die from the disease.

Drug resistance is becoming an increasing problem with malaria: the WHO found in 2010 that three of the five strains of malaria known to infect humans were partially drug resistant, and some had cross-resistance (resistance to multiple drugs with similar modes of action or that come from the same chemical family) or multidrug resistance. Consequences already recorded for drug-resistant malaria include longer periods of illness, increased mortality, increased cost of treatment, and increased transmission of the disease. In addition, it is feared that ineffective treatment in the public sector (because standard drug therapies fail) will push more patients to the unregulated private sector, where they may be exposed to substandard care as well as a course of treatment known to increase drug resistance.

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See Also: Biological Weapons; Epidemics; Infectious Disease; Influenza; Tuberculosis.

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E

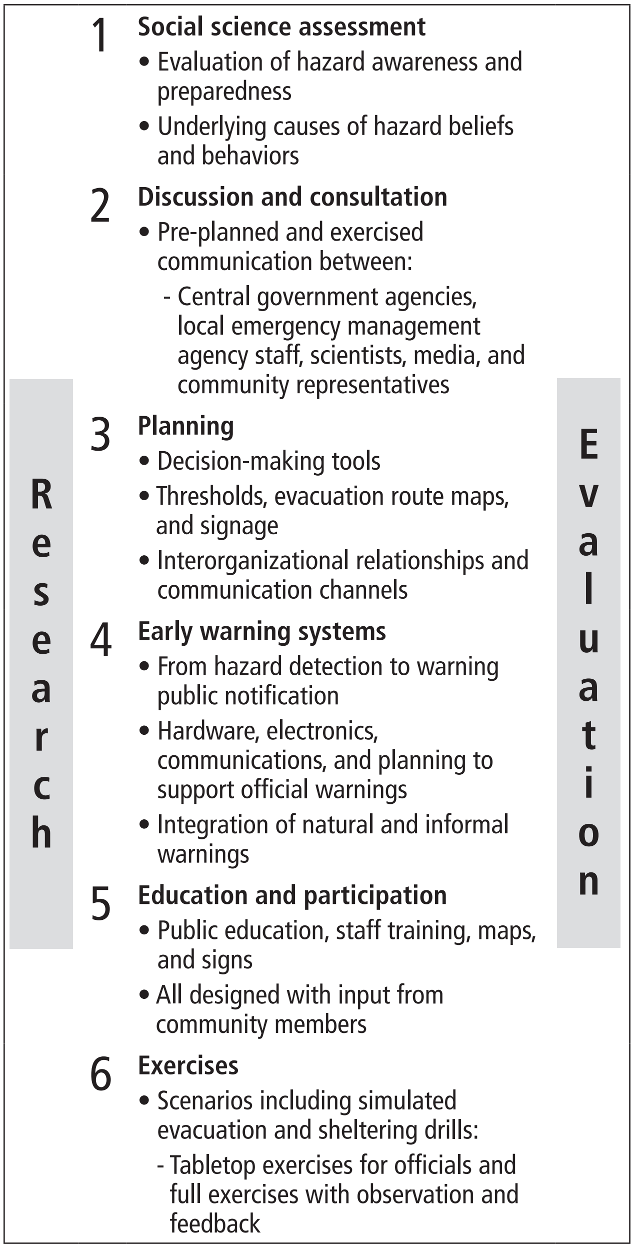
Early Warning Systems

Early warning systems are sometimes referred to as warning systems or emergency broadcast systems. They provide people with emergency information before or during crisis situations so that protective actions can be taken. The phrase *early warning system* (EWS) is often interpreted to mean the technological tools used by scientists to detect threats and communicate information through audible and written channels to emergency managers and to the public. However, EWSs are much more complex. They involve information links between the environment and people and between different groups of people. Information is communicated from multiple sources through multiple channels, ranging from sirens and reverse 911 calls to seeing or hearing cues from the environment. D. S. Mileti and L. Peek describe three basic subsystems of an EWS—hazard detection, emergency management, and public response—yet EWS models focus largely on the first two and much less on the public response subsystem. That is, the models do not accurately reflect the significance of the linkages between people and their observations of the environment and how these observations initiate the warning process and hence response to it. These linkages are, however, well described in the disaster research literature.

Specific elements are required for development of an effective EWS for crisis management. Characteristics of the environment interact with characteristics of society to produce an effective response. The following sections focus on technology used in crisis management, crisis decision making, and interagency relationships, including training and exercises. The case study describes New Zealand's experience with tsunamis from 1960 to 2010.

Early Warning Systems

Traditionally, scientists and emergency managers developed linear models to identify key parties and information channels in EWSs. Models predicted that the flow of information starts when scientists observe a hazard above a threshold (earthquake magnitude). Scientists analyze the data and contact emergency managers to issue an alert if a critical threshold is reached. Emergency managers then make decisions about whether to notify the media and public of the threat and recommend actions. The ultimate receiver of the message is generally considered to be the "public." Such linear models usually misrepresent the warning process in two ways. First, they highlight technology by focusing on the detection and emergency management subsystems, minimizing the public subsystem. This detracts from research findings that the public's first source of information and hence the beginning of response efforts is often human sensory experience with “natural warnings” or “environmental cues” that often precede the hazard (“feeling” ground motion in earthquakes). Moreover, research has shown that people’s first source of warning is often “informal warnings,” received and disseminated through multiple channels (face-to-face contact, cell phones, TV). Additionally, through the use of “social cues,” people look to what others are doing to decide how to respond. Second, warnings meant for and disseminated to emergency managers are sometimes simultaneously received by media and the public. This means that messages are being acted on by the media and public before emergency managers have reviewed a warning and coordinated their response recommendations.



1 **Social science assessment**
- Evaluation of hazard awareness and preparedness
- Underlying causes of hazard beliefs and behaviors

2 **Discussion and consultation**
- Pre-planned and exercised communication between:
  - Central government agencies, local emergency management agency staff, scientists, media, and community representatives

3 **Planning**
- Decision-making tools
- Thresholds, evacuation route maps, and signage
- Interorganizational relationships and communication channels

4 **Early warning systems**
- From hazard detection to warning public notification
- Hardware, electronics, communications, and planning to support official warnings
- Integration of natural and informal warnings

5 **Education and participation**
- Public education, staff training, maps, and signs
- All designed with input from community members

6 **Exercises**
- Scenarios including simulated evacuation and sheltering drills:
  - Tabletop exercises for officials and full exercises with observation and feedback

Figure 1 Model of an effective warning system
Source: Modified after Leonard, Johnston and Saunders, 2006.

Another problem with many EWSs is that responsibility for providing warnings is divided between federal and local government agencies whose mandates are sometimes different. Scientists often have the mandate to provide warnings to emergency management, but recommendations for protective action are the responsibility of local and state emergency managers. This particular division of responsibility for the management of crises requires that warnings or recommended responses are issued at multiple levels of government, at differing times, and by different entities. Predicting social response is made even more difficult when one acknowledges that prior to receipt of official warnings, people are responding to (1) initial natural warnings or environmental cues, (2) informal warnings from each other and the media, and (3) social cues. Moreover, official warning messages are rewritten by numerous government agencies and redisseminated to multiple receivers. This leads to numerous message sources, which has been shown to improve response to warnings by decreasing the time taken to confirm warnings, but this is contingent on the content of the messages being the same. Some argue that there is simply a digital information overload. Furthermore, rewriting messages increases the likelihood of human error in translation, which delays response because people seek additional information to sort out any discrepancies, offsetting the positive effect provided by multiple message sources.

Figure 1 is a model of an effective EWS that underscores the importance of planning and community member involvement in advance of a crisis. The EWS component of the model is placed last to indicate that other factors are equally. if not more. important in outcomes of early warning. Research and social science provide justifications for change and validation of system components.

Technology Use in Crisis Management

The digital age has created a sudden shift in technology available for risk communication channels and the style and content of information. Television, radio, handheld radio, and shortwave radio will continue to be good dissemination channels of information for the foreseeable future, but they are being supplemented by new digital technologies including cell phones, smart phones, Internet, e-mail, social media (Twitter, Facebook), tablet computers (iPad), and online blog sites. Furthermore, new online software allows real-time mapping of at-risk areas, including evacuation routing through programs such as Google Earth. Moreover, some smart phones may serve as mobile scientific instruments capable of detecting seismic ground motion and live data streaming to scientists (iShake project in California), improving spatial accuracy of damage estimates.

Social media have proven an effective platform for coordinating crises. Although they show promise for information exchange and mobilization of resources, little is known about the cyberpsychology that guides people to take protective action behavior. Social networking analysis identifies trends in localized behaviors and offers opportunities to identify where cluster behaviors are likely to occur, allowing emergency managers to intervene.

Crisis Decision Making

During emergencies, response personnel make critical decisions with implications for tens to millions of people. Such situations are often characterized by poorly structured problems, uncertain and dynamic environments, and poorly defined and competing goals across agencies. Moreover, all of this must be done within short time frames and highly stressful environments. In this response environment, decisions involve two distinct steps: (1) a definition of the problem obtained through a situation assessment (SA) and (2) a choice of what to do to protect human health and the environment. SAs identify the primary problem and expected secondary or tertiary fallout. Success requires the correct evaluation of the characteristics of the event, and this involves initial scientific information and the application of standard operating procedures (SOPs), or adaptive and intuitive knowledge that has trained individuals to holistically conceptualize the fallout of the initial conditions and to take appropriate actions. M. R. Endsley considers SA at three levels: accurate perception of factors influencing the environment (spatially and temporally), understanding and comprehension of the real-time situation in relation to desired outcomes, and projection of the status of the event as people meet specific goals.

Organizational decision makers may make correct decisions based upon their perception of the situation, but if their SA is inaccurate, this may negatively influence their decisions about what to do. The second decision-making step concerns the choice of action. This involves (1) recognition-primed and intuition-led action, (2) action based on written or memorized procedures, (3) analytical comparison of different options, and (4) creative, novel design of action. Given the inherent uncertainties often found in crisis situations, the first strategy (intuition-led) has been argued to be more flexible and hence more effective than the others. Effectively implementing such action requires expertise through experience, pre-planning activities, and training to recognize both the situation and the appropriate actions, in addition to accurate SA throughout the crisis.

Interagency Roles

Crisis decision making occurs on individual and team levels. It involves distributed personnel across multiple agencies and geographic and political regions. Effective decision making at this level requires "team situation awareness." According to an assessment by D. Paton and D. Jackson (2002), it is intrinsically related to and dependent upon a team's shared mental model of the problems and tasks at hand. Here, individual team members within and across organizations develop mutual understanding of each other's knowledge, skills, roles, and needs, enabling them to anticipate each other's requests and move from explicit requests to implicit supply of information in communications.

The numerous agencies and their personnel involved in EWSs are essentially members of an extended and distributed team. They range from police, emergency managers, and fire service through to scientific advisers, business owners, and employees. Shared experience among members becomes vital for improving mental models, SA, and their responses. Such characteristics are developed and enhanced through

Case Study: Early Warning and Emergency Broadcast Systems in New Zealand

New Zealand, situated on the Pacific "ring of fire," is susceptible to significant tsunami hazards (see Figure 2 for wave travel times to/from New Zealand). These include tsunamis from local offshore landslides or faults; regionally from areas including the Southern New Hebrides, Tonga, and the Kermadec trench and the volcanoes associated with it and from farther afield, including South America, Cascadia, Alaska, Kamchatka, Japan, and the Solomon Islands. Paleotsunami records indicate there have been at least 15 events in the last 7,100 years that have produced significant tsunamis, with nine of these producing waves of 10 meters or more. Even with this extensive history of tsunami hazard, it was only in 1960 that New Zealand officials began taking note of tsunami risk.

On May 22, 1960, an magnitude 9.5 earthquake occurred in southern Chile, and the absence of a Pacific-wide tsunami warning system in countries beyond the United States meant that the tsunami struck New Zealand without an official warning. Fortunately, there were no New Zealand casualties, mainly because the wave arrived during low tide, but there was significant coastal damage. This event led to significant changes in the way tsunami hazards and risk were managed in New Zealand, notably its membership in the Pacific tsunami warnings system. However, public awareness of tsunami risk and preparedness waned significantly between 1960 and 2004 during a quiescence of tsunamis.

Indian Ocean Tsunami

The 2004 Indian Ocean tsunami led to significant improvements in the political and policy support for tsunami risk management and the human and financial resources to allow the establishment of mitigation measures and improved crisis management capability. In 2005, the New Zealand government mandated establishment of a National Exercise Programme, ranging from regular Tier 1 Local Exercises through Tier 4 National Exercises, to improve the nation's response to tsunamis and other crises. In 2007, a national-level Tsunami Working Group was established. It supported initiatives at local and regional levels as well as improved guidelines for evacuation zones and signage, upgraded warning procedures, and enhanced exercising at national and local levels. However, even with extensive review of national, regional, and local procedures for tsunami crisis management, problems still arose when an magnitude 8.1 earthquake occurred on September 30, 2009, near Samoa. The Ministry of Civil Defence and Emergency Management (MCDEM) implemented its tsunami response procedures, issuing a national warning, activating the National Crisis Management Centre to coordinate the regional and local CDEM groups, and managing media inquiries and public information. Although some actions worked well, a number of problems were identified and confirmed by response to a tsunami warning triggered just one month later from an magnitude 7.8 earthquake on October 8, 2009, in Vanuatu. Post-event reviews identified liaising issues between scientific advisers and MCDEM; a lack of scientific information in advisories, including a lack of information on "what to expect and what to do"; a lack of sufficient staff for media inquiries; and a lack of understanding of which media outlets were broadcasting. Compliance with recommendations had to be established soon after. About this time, a magnitude 8.8 earthquake struck off the coast of Chile on February 28, 2010. Fortunately there had been enough time to implement many of the recommendations that emerged from the 2009 Samoan event, and there was an overwhelmingly positive New Zealand response to the warning.

Exercise Tangaroa

In October 2010, New Zealand had yet another opportunity to test the latest tsunami recommendations and improvements with the implementation of a Tier 4 real-time Exercise Tangaroa, a national test of response to a distant tsunami from South America. These case studies and the evolution of procedures, plans, and warning messages highlight the importance of reviewing previous events to successfully improve future response. It is vital that reviews are conducted in the context of learning for the future, so important recommendations are implemented rapidly, as another event can occur within hours, days, or months. In addition, it is crucial that lessons and the knowledge of tsunami risk be kept a public and official priority through education and exercises. If the 2004 tsunami event had occurred in New Zealand waters, there would also have been widespread devastation and loss of life because the awareness of tsunami risk had declined so significantly since 1960. The unpredictable and infrequent timing of large, damaging tsunamis, combined with increasing density of populations and development in coastal zones, means that nations must continually strive to maintain an ability to manage the inevitability of tsunami crisis.

multidisciplinary planning activities, collaborative exercises and simulations, and a thorough analysis of past performance in exercises and crisis events. Post-event analysis is vital for both large- and small-scale events because it allows identification of whether responses met actual needs. It also helps ensure that a successful response does not lead to an optimism bias whereby people tend to overestimate future response preparedness and capability. This is particularly applicable when a crisis has not recently constituted a major test of response efforts. For example, response to Hurricane Katrina in the United States in 2005 was significantly hindered by differences in the cultures of organizations involved with emergency response and by a lack of interagency trust, before Katrina formed.

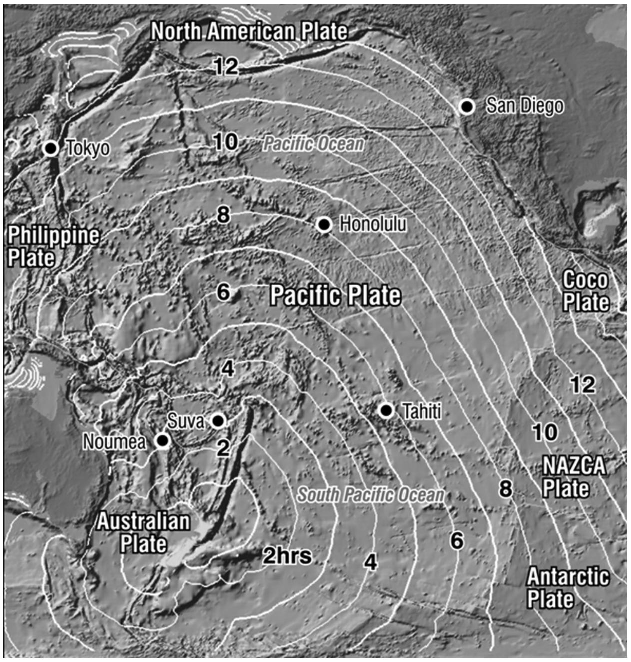


Figure 2 Tsunami wave travel times for New Zealand

Effective communication across agencies is highly dependent on the development of interpersonal and interorganizational trust. Establishment and maintenance of trust requires that teams deliberately work together before a crisis to develop shared mental models. Effective training through periodic exercises supports the development of realistic expectations of operational responses, while also promoting a shared and realistic understanding of decision makers' capabilities for many scales of crises. "Scenarios" should also be used to help ensure that exercises are realistic and have the potential to reduce uncertainty resulting from a lack of understanding of likely impacts and outcomes. Scenarios should reflect investigations of the impacts and of response and recovery issues relating to potential crises. They should adopt realistic timelines and test critical decisions, such as response to variations in hazard thresholds and the fluctuating area of corresponding evacuation zones. This is particularly important for EWSs, when extremely short windows of time for effective critical decisions will be fundamentally dependent upon responders' understanding of their roles, responsibilities, skills, and needs, in addition to those of others.

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See Also: Emergency Alert System; Emergency Public Information; Mass Media; News Media; Response; Warning.

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Earthquakes

Devastating earthquakes strike without warning, surprising the affected population and offering little time to make critical decisions in response to the event. Although disaster mitigation and preparedness planning activities can greatly reduce loss of life and destruction of property, a significant number of people living in earthquake-prone areas still remain ill equipped to respond to and recover from seismic events. In part, lack of preparedness can be attributed to the continued need for populations living in high-risk areas to be constantly ready for an earthquake that may not occur in the months and years to come. However, the 2011 Tohoku earthquake dramatically revealed that even when populations are well prepared, like the Japanese, earthquakes can trigger a cascade of disasters, each with their unique characteristics and demands.

Adoption of an all-hazards model for crisis management, the 2008 National Response Framework (NRF), has been widely promoted by a variety of federal and state government agencies and relief organizations. This type of approach has its merits when responding to several types of disasters that are unfolding simultaneously or sequentially. The NRF includes best practices for managing disasters of any type, severity, and size. Nonetheless, it is important to note that crisis management activities executed during and after a seismic incident differ in significant ways from those planned and performed for a tsunami or a nuclear accident. For example, although evacuation from threatened or affected areas is important for all three types of disaster, unlike the two natural disasters, a nuclear accident has an invisible threat from radiation and requires specific actions for protection and decontamination in the immediate aftermath as well as during the recovery period. In our increasingly complex society, brief earthquakes have the potential to trigger long-term, far-reaching destruction that goes well beyond the collapse of physical structures.

U.S. Seismic Activity and Threat

On average each year, a few thousand earthquakes of varying magnitude take place throughout the United States. Annually, approximately 70 to75 earthquakes occur worldwide that cause significant damage. An earthquake is formed by a series of foreshocks, mainshocks, and aftershocks. The size and duration of the mainshock are indicative of the severity of subsequent aftershocks, which can continue for weeks, months, or even years after the initial tremor.

Specific areas of the United States are noted for their potential for significant seismic activity that would not only result in a large number of deaths because of population density but would also cause extensive damage to the infrastructure, water supply, and transportation system. In the early 1800s, four of the largest earthquakes occurred in the New Madrid Seismic Zone, a seven-state area that encompasses Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee. This area remains at high risk for a catastrophic earthquake and has long been a focus of crisis management endeavors.

The San Andreas Fault is one of several active faults located in California. Researchers, government officials, and the media have centered their attention on northern California, where a megaflood could occur should portions of the 2,600-mile levee system in the Sacramento area be destroyed during an earthquake. If the levees are breached, the supply of fresh water to farms and people living in southern California would be contaminated by saltwater. The adverse effects of a megaflood triggered by an earthquake would reach far beyond California and affect the national food supply as well as the global economy.

Understandably, people living in areas typically not associated with seismic activity are at even greater risk for adverse outcomes during an earthquake. Although there were no reports of major damage or deaths from the 2011 earthquake that shook offices and homes in New York City, Washington, D.C., and Virginia, it was widely acknowledged that people living in those areas are very unprepared for this type of a disaster.

In smaller, more rural communities, there is a new and growing concern about the association between hydrofracking, the process of extracting natural gas from shale rock formations, and earthquake activity in historically inactive areas of the United States. At present, this relationship is poorly understood and is being evaluated by scientists and regulators. A number of government agencies have joined forces to address these varied concerns and to establish sound crisis management programs.

National Programs Planning for Earthquakes

Four agencies constitute the National Earthquake Hazards Reduction Program (NEHRP) Interagency Coordinating Committee (ICC): the National Institute of Standards and Technology (NIST), the Federal Emergency Management Agency (FEMA), the National Science Foundation (NSF), and the U.S. Geological Survey (USGS). To reduce the impact of earthquakes in the United States, the NEHRP agencies collectively gather data on environmental and structural risks for geological disasters and the human responses to such crises. By analyzing outcomes, the ICC works to improve mitigation, prevention, preparedness, education, and disaster response management.

The NIST is the lead agency responsible for coordinating and planning the NEHRP. By conducting earthquake engineering research, the NIST strives to reduce earthquake risk by innovating and updating technical standards for current and future infrastructure in the United States. FEMA educates professionals and communities in emergency management, promotes disaster preparedness, and facilitates post-disaster recovery. FEMA integrates current research in promoting earthquake-resistant building design and in implementing the National Response Plan after an earthquake or other disaster occurs.

The NSF supports a wide range of earthquake research, from early detection of seismic events to development and evaluation of methods for structural and social recovery. The NSF also uses the Network for Earthquake Engineering Simulation (NEES) to create hazardous earthquake conditions for testing structural safety outside an actual disaster. The USGS primarily monitors the status of all natural resources in the United States, including observing and evaluating earthquake activity. The USGS is also responsible for developing and disseminating seismic hazard maps to guide the development of future infrastructure in the United States. In the 2000s, significant progress has been made to coordinate the efforts of federal and state agencies, strengthen mitigation and preparedness practices, and develop effective crisis management programs. However, aging bridges, tunnels, and levees make the United States highly vulnerable to both the short- and long-term consequences of major earthquakes.

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See Also: Cascading Crisis; Critical Infrastructure; Floods; Multiple Disaster Problem; National Response Framework; Nuclear Risk; Preparedness; Prevention; Recovery; U.S. Geological Survey (USGS).

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Ebola Virus

Ebola virus is one of the deadliest known viruses, and it results in severe acute viral illness, known as Ebola hemorrhagic fever (EHF). The first recorded Ebola patient was a schoolteacher named Mabalo Lokela from the village of Yambuku, Zaire, diagnosed on September 5, 1976. Since 1976, there have been sporadic outbreaks of Ebola in the central African countries. A conservative estimate is that there have been at least 1,800 cases and 1,300 deaths.

Outbreaks

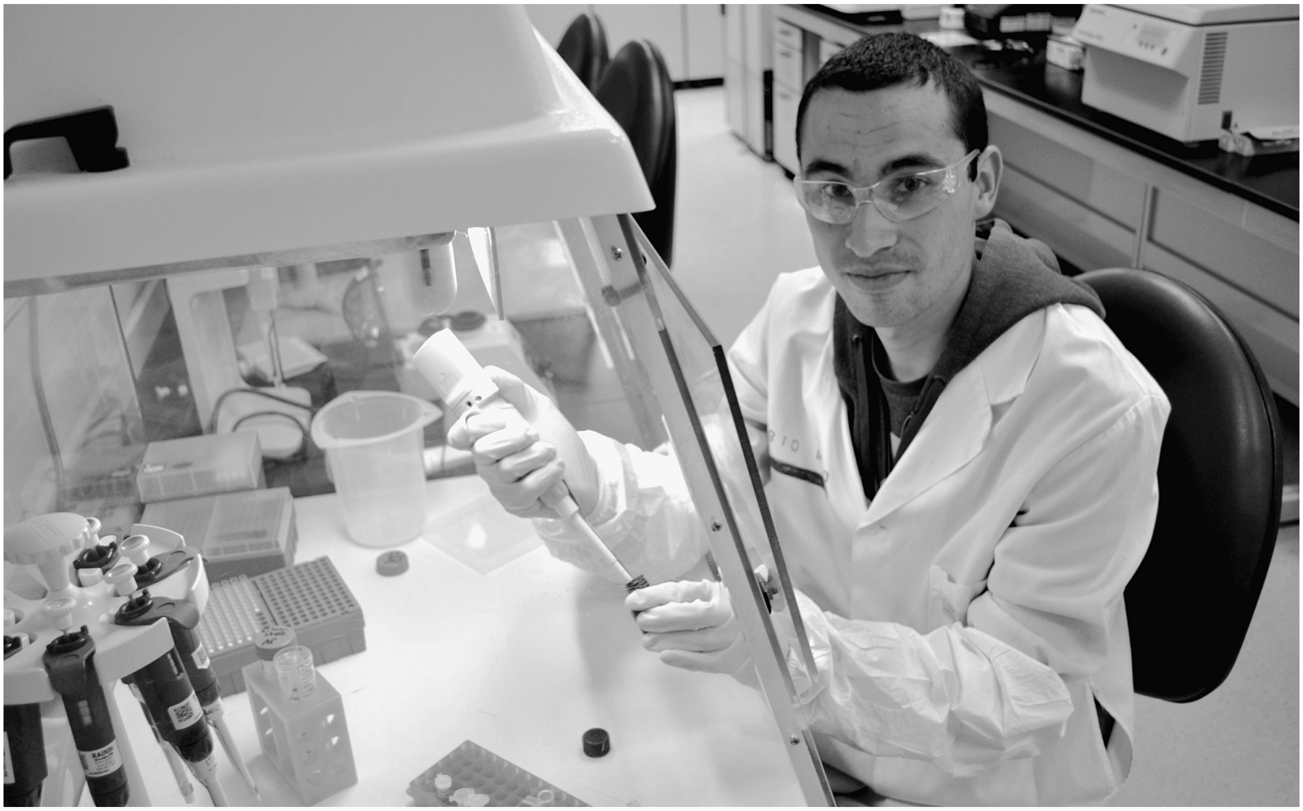
The first documented outbreak of Ebola was in the African countries of Zaire (presently known as the Democratic Republic of the Congo [DRC]) and the Sudan. Both countries had approximately 300 people infected, and the mortality rate was 88 percent in Zaire and 53 percent in Sudan. The Zaire subtype is the most deadly strain. The disease spread was the result of direct contact with the infected, insufficient contamination procedures, and unsanitary hospital practices, such as reusing needles. A second outbreak occurred in both countries in 1977 and 1979. A new subtype was found in Côte d'Ivoire, assumed to have originated from a person dissecting a monkey, in 1994. In 1995, a major outbreak occurred in Kikwit, DRC, where 315 people were infected and 244 died. Three outbreaks occurred in Gabon, in 1994–95, resulting in 98 deaths out of 150 cases. Uganda in 2000–01 had an outbreak of 425 cases with 224 mortalities. In 2001–03, sporadic outbreaks occurred in Gabon and the DRC, resulting in 278 cases and 235 deaths. Another outbreak occurred in the DRC in 2007 (249 cases/183 deaths). Also, in 2007 a relatively mild fifth strain of Ebola was identified in Uganda and is called Bundibugyo.

Classification and Subtypes

Ebola gets its name from the Ebola River in Zaire (aka DRC). The Centers for Disease Control classify Ebola as a biosafety level four, which is reserved for the most deadly and exotic diseases. Ebola virus is listed as ICD-10-CM A98.4 under the International Statistical Classification of Diseases and Related Health Problems (called ICD, for short). Ebola is a filovirus, which belongs to the virus family Filoviridae. There are only two members in the Filoviridae family: *Ebolavirus* and *Marburgvirus*. Both are classified, under the Baltimore classification, as a Group V virus because the viruses possess negative-sense single-stranded RNA genomes. There are five subtypes of Ebola viruses (based on location where they were first identified): Zaire (ZEBOV), Sudan (SEBOV), Côte d'Ivoire (CIEBOV), Bundibugyo, and Reston (REBOV [nonhuman]). The first four were located in central African countries, and Reston is from the Philippines. The first three cause a severe form of hemorrhagic fever in humans, and Bundibugyo is considered a mild strain. REBOV is not known to result in human illness but is fatal to monkeys.

Natural Reservoir

The natural reservoir (host) is presently unknown but is suspected to be a zoonotic virus that lives in the rainforest of Africa and the western Pacific. Even though the infected humans have been linked to nonhuman primates, such as chimpanzees, gorillas, monkeys, and other animals, such as forest duikers (antelope) and porcupines, these are not considered the natural reservoir. It is suspected that nonhuman primates are acquiring it from a different source. Bats are suspected to be a natural reservoir, with evidence pointing at fruit bats as the likely natural reservoir because of having asymptomatic infection of the Ebola virus.



Stanford University student Cesar Ambriz, an intern with the U.S. Department of Homeland Security's HS-STEM program, works on a portable diagnostic test to determine the presence of various viral DNA for organisms like Ebola in biological samples. Most viruses are cultured in a lab, a time-consuming and expensive process. A portable assay with minimal sample preparation could be modified to test for new pathogens and could handle 72 samples in 24 hours, aiding in detection during a bioterrorist attack or suspected outbreak.

Transmission

The chain of transmission has not been established conclusively. It is alleged that the Ebola virus can be directly transmitted from infected bats to humans. Ebola also can be transmitted from the handling of infected chimpanzees, gorillas, monkeys, duikers, pigs, porcupines, or fruit bats (dead or alive). In human populations, Ebola is transmitted by contact with an infected human's blood, secretions, organs, or other bodily fluids (e.g., semen or vaginal fluid) as well as direct contact with the infected person, such as caring for the ill or burials. Nonhuman primates can be infected by respiratory pathway, but humans are assumed to be immune to airborne Ebola virus.

Incubation, Symptoms, and Diagnosis

Ebola's incubation period ranges from two to 21 days. The symptoms during the early incubation period are similar to those of other viral infections, such as aches, chills, diarrhea, fever, headache, low back pain, nausea, sore throat, emesis (vomiting), and weakness. Symptoms in the later stages include hemorrhaging (bleeding) from the eyes, ears, and nose; gastrointestinal hemorrhaging (bleeding from mouth and rectum); impaired kidney and liver function; multiple organ failure; rash (maculopapular) across the entire body, generally accompanied by bleeding; and swelling of the eyes (conjunctivitis) and genitals (labia and scrotum).

The diagnosis of the Ebola virus is confirmed by laboratory tests of blood or serum samples, which identify the presence of antigen or genomic/subgenomic RNA. Specimens collected during severe stages of EHF are the optimal for isolating the Ebola virus. An electronic microscope can confirm filovirions but cannot discriminate between filoviruses, even though they have different lengths. Immunofluorescence assays (IFA) are used to confirm the presence of the Ebola virus via a cell culture, but the results can be misleading. Diagnosis in the field commonly consists of reverse transcription polymerase chain reaction (RT-PCR) used in combination with antigen-capture enzyme-linked immunosorbent assay (ELISA). Testing of Ebola virus is considered an extreme biohazard risk and should be performed under highest biological containment protocols. There have been two laboratory accidents in Russia and one at Porton Down in the United Kingdom involving the Zaire ebolavirus, all resulting in death.

Prevention, Treatment, and Management

There is no cure or vaccine for EHF. Prevention includes practicing strict barrier procedures, isolating the patient, and using new needles. Other prevention strategies include avoiding direct contact with blood and/or bodily fluids, or with deceased EHF patients, and close contact or handling nonhuman primates, duikers, pigs, porcupines, or fruit bats. Treatment consists of providing patients with fluids (intravenous fluids or oral), sustaining blood pressure and oxygen levels, and treating them for any secondary infections. Management of Ebola cases requires identifying the people the patients have interacted with. All hospital staff and first responders need to be briefed on prevention protocols, transmission routes, the lethal nature of the virus, and proper handling of infected persons and soiled clothing and other material.

Ebola as a Bioweapon?

During the Cold War, Russian scientists at Biopreparat experimented with Ebola as a bioweapon. Former First Deputy Director of Biopreparat Ken Alibek hypothesized that Russian scientists may have aerosolized Ebola as a bioweapon. Aum Shinrikyo, a Japanese cult, had a member go to Zaire to collect the virus for use as a bioweapon. However, many scientists consider the possibility of Ebola being used as a bioweapon as unlikely because its lethal nature makes it impractical to transport and it is not known to be airborne.

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See Also: Biological Weapons; Cholera; Doctors Without Borders; Epidemics; Health and Medical Response Scenarios; Infectious Disease; Infestations, Parasite; Influenza; Malaria; Measles; Pandemics; Public Health Surveillance; Quarantine; Severe Acute Respiratory Syndrome (SARS); Smallpox; Tuberculosis; Vaccinations; Vulnerable Populations; World Health Organization (WHO), UN.

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Electronic Media

Historically, the term *electronic media* was used primarily to distinguish technologies such as broadcast and cable television or radio from print newspapers and magazines; it later expanded to include video games as digital cultural artifacts. In today's convergent media environment, it becomes increasingly difficult to distinguish between "electronic" and other forms of media, as nearly all traditional media outlets also publish at least some content electronically online, and produce content in multimedia formats. The broad category of electronic media now also includes more interactive forms of online communication such as social media and text messaging, as well as institutional Web sites that may contain both static and dynamic content. With the growth of mobile technology, media and communication platforms that rely exclusively or in part on apps for smart phones or tablet devices are also becoming widespread. Electronic media thus encompass a wide variety of content and delivery modes. In the context of crisis management, electronic media constitute means for delivering, broadcasting, receiving, and sharing information throughout all stages of a crisis: before, during, and after. In addition to advantages such as rapid dissemination and extensive reach of time-sensitive or critical information, electronic media also pose additional challenges for crisis managers.

Features of Electronic Media

Studies have shown that different categories of media represent crises differently, so an understanding of different media platforms is important for effective crisis management and communication. Given the complexity of the electronic media landscape, it can be challenging to group media based on traditional nomenclature, such as newspapers, television, radio, and so on. This is especially true with newer formats such as Web sites, mobile apps, podcasts, and social media included under the umbrella term *electronic media*. Instead, it can be more useful to classify media based on four basic dimensions of format, velocity, directionality, and permanence. Format can be classed as text, audio, video, images, or any combination thereof; it can also refer to the relative length of media artifacts. For example, institutional Web pages allow for long documents that may consist of text as well as photographs and embedded video or audio. Podcasts are typically audio recordings, including recorded radio broadcasts, although sometimes the term is used to refer to audiovisual content. Given the decline in real-time audiences for television and broadcast news and the increasing prevalence of mobile devices, the use of diverse formats can allow crisis managers to communicate more effectively with stakeholders.

The relative velocity of a medium indicates how quickly new content or changes can be expected to reach stakeholders or diffuse to other audiences. Multiple electronic media can be used to maximize velocity when necessary. For example, subscription technologies such as really simple syndication (RSS) can be employed to notify subscribers when new information is available and deliver it to a dedicated reader. Social media outlets such as Twitter or Facebook can not only notify followers but also allow them to share links to content with their own social networks. Leveraging multiple delivery modes makes it possible to maximize the reach of time-critical information in a crisis situation.

Some electronic media are designed as one-way communication systems, whereas others allow dialogue. The directionality of a given medium is therefore another factor to be taken into consideration when deciding how, and with whom, to communicate at any stage of a crisis. Social media offer the convenience of rapid information dissemination, but sending messages through these platforms constitutes opening a channel of conversation with users. Crisis managers should be prepared to answer questions and, in some cases, respond to negative comments that can arise when emotions are high as a result of a critical situation (see discussion below of some of the challenges associated with communicating via electronic media, especially online).

Finally, especially in disaster management scenarios, it can be important to provide content that remains available to users for an extended period of time. One of the advantages of convergent media in these instances is that news packages can be archived (often by both the media outlets and the organization or organizations providing important information) for retrieval. Background details, fact sheets, vital instructions, contact information, and other key data should be communicated using electronic media platforms that allow for some permanence of the content. By contrast, conventional radio and television broadcasts are ephemeral, available only to those who tune in to them in real time. Similarly, followers may miss important news communicated via social media platforms such as Twitter, which does not store information long term. Institutional Web sites and media archives are typically the most reliable sites for archiving crisis information.

Trends in Electronic Media

As noted above, the two primary trends influencing the electronic media landscape are convergence and mobile technology. Convergence refers to the increasingly blurred boundaries between media formats: television (or television-like) content can now be accessed not only by means of a conventional television set but also on devices such as desktop or laptop computers, tablets, and smart phones. News organizations typically publish content to online editions of their publications or stations as well as via traditional print, radio, and broadcast outlets, but may also provide text messaging and push notification services for breaking news, deliver headlines via Twitter, and include interactive infographics, audiovisual content, slideshows of photographs or graphic art, and topical collections of links as part of their news packages. Perhaps more important, this array of information and content can be assembled by any organization or even an individual, without the need for highly specialized skills.

Convergence can make it easier for organizations and institutions to provide a wide range of information to media and stakeholders during the various stages of a crisis or emergency but can also dramatically increase the number of competing voices offering the public conflicting information. Convergence also requires organizations to create content in multiple formats to satisfy the technical limitations of various kinds of devices and meet different information needs. See the section below on the advantages and challenges of electronic media for more discussion of this topic.

The rise in mobile technology is creating one of the most dramatic changes in communication, with particular implications for crisis management teams. The ability to report to others directly from the site of a critical event with photographs, video, and real-time accounts can allow effective crisis teams to handle rapidly evolving situations with greater agility. Time-sensitive information can be delivered immediately to the public or to specific stakeholder groups. Those directly involved in, affected by, or observing the crisis as it takes place can also communicate with emergency personnel, volunteers, and the general public.

Within the area of mobile technology, the increasing popularity of augmented reality applications is also of interest for crisis management. Augmented reality consists of a layer of information superimposed over a real-time view of one's surroundings; this content is delivered to users via a special mobile browser. Augmented reality applications can provide background on a location, navigational information, and images of the same location at different times of day or over time. Public institutions and emergency organizations can rapidly update and publish accurate information about an area in the wake of a crisis for use by residents, visitors, or even emergency staff.

Electronic Media

The same features of electronic media that can be used for general classification purposes—along with other distinctive characteristics of the electronic media environment—can represent both advantages and challenges before, during, and in the aftermath of critical situations.

Efficient mass dissemination of messages and information: The ability to make multimedia content available to virtually unlimited audiences with or without the intervention of traditional media gatekeepers, quickly and inexpensively, makes electronic media an extremely efficient mode of communication at all stages of a crisis. However, this efficiency is not equally distributed among stakeholders. During an emergency situation that affects power or telephone service, or in a natural disaster, many people will be without access to radio, television, or online sources of information.

Even during normal circumstances, there are disparities in access to electronic media of all kinds based on geography, socioeconomic status, and overall media literacy, among other factors. It is therefore important to consider who the potential recipients of content may be and develop a multifaceted communication strategy that takes different levels of access into account. Furthermore, the sheer quantity of information to which most people are exposed in contemporary society can make it difficult to garner attention in critical situations; messages should be crafted with this potential obstacle in mind.

Public discourse and conversation: Today's electronic media give extensive reach to individuals and organizations that might previously have struggled to find an audience, and nearly instantaneous indexing by search engines means that anyone can rapidly locate a variety of perspectives on a crisis with relative ease. Crisis managers have unprecedented access to a vast range of discourse, including local news, campus publications, small newsletters, trade organizations, and members of the general public, often even in the early stages of a crisis. This can make it easier to identify and respond to concerns quickly and effectively. For example, in March 2012, after a JetBlue pilot suffering a breakdown was subdued by the crew and passengers during a flight from New York to Las Vegas, forcing a diversion to Texas, the airline was inundated with questions via Twitter and Facebook. The company was able to respond promptly to stakeholder queries and develop a messaging strategy based on its awareness of key areas of public concern.

Archiving: The ability to archive electronic media, both externally and internally produced, is a valuable asset to organizations and institutions in adjusting their crisis management strategies based on careful analysis of past crisis situations. However, the virtually permanent availability of press releases, media coverage, opinion statements, and other crisis-related content can also prove to be a liability in the case of controversial situations or organizations. Information, regardless of its accuracy, can resurface at any time and cause long-term repercussions. For example, links to news reports of a 2006 outbreak of *E. coli* in spinach crops are frequently included in sidebars to media coverage of new food contamination events, organic food regulations, or food safety issues. Spinach sales in the United States have never fully recovered to their previous levels.

Monitoring electronic media: Given the above, crisis managers and communicators need to maintain ongoing awareness of the overall electronic media environment. A number of automated and semi-automated tools can facilitate the task of monitoring, an activity known as "infoveillance": however, a comprehensive environmental scanning procedure should involve people throughout an organization or community who are attuned to potential crises that may emerge from unexpected quarters or that do not match a predefined set of search keywords. The speed and social reach of information (and misinformation) is such that a situation can rapidly devolve into a more severe crisis than necessary if it goes unchecked.

Over the course of a weekend in November 2008, a print and video advertising campaign that the Motrin painkiller brand had launched several weeks earlier caught the attention of a number of mothers who were active in the blogging community. The campaign promoted Motrin as a remedy for mothers' back pain caused by wearing infants in slings. The mocking tone of the commercial sparked the outrage of certain influential "mommy bloggers," which spread so rapidly and widely via social and other electronic media that when the company finally became aware of the situation on Sunday afternoon, it determined it had no recourse other than to recall the entire campaign.

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See Also: Crisis Communications; Mass Media; Public Relations; Social Media.

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Electronic Vaulting

The emergence and rapid proliferation of e-commerce and Internet-based services have stimulated significant changes in the business continuity and disaster recovery industries. In today's new business venue, ensuring secure and uninterrupted business operations is of paramount importance for both public and private organizations. Sound business continuance requires planning and bracing for all types of business disruption, ranging from human error, power problems, and hardware failures to catastrophic natural disasters and external or internal sabotage or terrorist attacks.

A vital component of business continuity and disaster recovery planning is data storage and backup applications. Among different data backup methods and practices, electronic vaulting is a relatively new technique that is becoming increasingly popular in the disaster recovery industry. Although electronic vaulting has traditionally been used for only high-end solutions, it has emerged as a feasible strategy for enterprises of all sizes in recent years.

Electronic vaulting, also referred to as e-vaulting, is the process of periodically transferring backup data to an alternate off-site location over high-speed networks. Some integral components of electronic vaulting characterize and distinguish it from traditional backup strategies. The main components are (1) offsite data storage, (2) reduced recovery time objective, (3) reduced recovery point objective, and (4) data security and confidentiality.

Offsite Data Storage

A disaster-proof data protection strategy requires that backup data are not only off-line but also off-site and out of reach. However, most companies use their own methods to back up data within their facilities. Although such traditional methods may ensure against minor disruptions caused by technical problems or human error, they are useless in case of a major disaster. Furthermore, on-site backup data is vulnerable to hacker attacks and viruses as well. Therefore, a true data protection and recovery strategy should incorporate an off-site storage component. This strategy makes sure that data are always accessible and up-do-date in at least two alternate locations. Utilizing an off-site facility located at a geographically distant region further ensures against widespread natural disasters.

Reduced Recovery Time Objective

In business continuity planning, the recovery time objective is defined as the maximum tolerable length of time in which business-critical data may be lost in case of a disaster. Traditionally, business continuity plans include a process for data protection in which daily backup data in the forms of magnetic tapes or disc drives are physically transported to a secure facility. This process is called physical off-site vaulting. The recovery process in physical off-site vaulting lasts hours or even days and includes some risks such as damage and loss of data during transportation.

Unlike physical off-site vaulting, electronic vaulting can transfer large batches of data off-site at high speeds and instantly retrieve them in the event of a disaster. Internet-based recovery service provided by electronic vaulting enables organizations to have their systems running in minutes. Therefore, electronic vaulting eliminates the cost, time, and labor required for the multi-day process of transporting backup disks and tapes off-site and bringing them back in the event of a disaster.

Reduced Recovery Point Objective

Recovery point objective refers to the point in time from which the system can restart after a disruption. Depending on the criticality of the data to be preserved, electronic vaulting enables companies to back up data more frequently, which ensures a more current and up-to-date archive off-site. As a result, electronic vaulting significantly reduces recovery point objective and ensures real-time recovery in case of a disaster.

Data Security and Confidentiality

Security and confidentiality of data to be stored off-site by third parties is a significant concern for many organizations, especially for those that want to back up information vital to continuance and even survival of their businesses. Data storage and recovery strategies in which security and confidentiality of data are not ensured leave business-critical data vulnerable to hackers, thieves, and competitors. Encryption is a common solution to these security concerns and a guaranteed method to secure backup data off-site. Electronic vaulting solutions encrypt data at the source before they are transmitted over the Internet to the remote backup site. Data remain encrypted and fully protected throughout their lifetime at the off-site location, and only users with the correct password can decrypt and access them.

The electronic vaulting process is often outsourced to professional and specialized companies. Utilizing advanced telecommunication technologies, these companies offer almost limitless variations on the level of protection and recovery, depending on customer needs and priorities. The banking sector, for instance, where even a few minutes of financial data are extremely important, uses high-end electronic vaulting services to ensure real-time data security. Advantages and benefits of outsourcing the electronic vaulting process include streamlined operations, reduced labor cost, and increased backup and recovery performance.

Electronic vaulting represents a transition from a reactive and separate disaster recovery strategy to a proactive part of the business continuity and contingency planning process. In that regard, electronic vaulting can be seen as another kind of business insurance. With the advancements in data storage technology in recent years, storage hardware prices and the cost per gigabyte to store have significantly decreased. Furthermore, this decreasing trend in data storage prices is projected to continue in the future. Therefore, electronic vaulting today is not a business solution solely affordable for large enterprises. Rather, for small-to-large organizations, electronic vaulting is emerging as a viable technical contingency solution in business continuity plans for all environments.

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See Also: Alternate Site; Backup Facility; Backup Media; Backup Strategy; Business Continuity Management; Business Continuity Planning; Business Continuity Planning Life Cycle; Business Resumption Planning; Contingency Planning; Criticality Assessment; Data Mirroring; Data Recovery; Disaster Recovery; Disaster Recovery Life Cycle; Disaster Risk Reduction; Disruption of Organizations; Downtime; Failover; Hazard Mitigation; Journaling; Minimum Business Continuity Objective; Recovery Time Objective.

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Electronics Waste

Electronics waste has turned into a waste crisis, representing 8 percent of the global solid municipal waste stream. Mountains of electronics waste (e-waste) are snowballing at rates of over 50 million tons a year. Because much of the waste often ends up in incinerators or landfills, only a small proportion is currently being recycled. Take-back schemes have been introduced in several countries in the European Union (EU) and globally; however, many countries are slow to adopt suitable schemes, and some lack the capacity to deal with the vast quantities that are being generated.

Electronics waste, also known as e-waste, is defined as discarded electronic equipment such as televisions, batteries, mobile phones, and computers. The majority of e-waste can be mined for its raw materials (e.g., copper, gold, and aluminium) and harvested for components. Legal e-waste recycling markets are currently valued at over $6 billion per annum. The soaring rate of e-waste can be attributed to technological advances as old technology becomes obsolete, mass consumer trends, and products nearing the end of their shelf life.

The Basel Convention was agreed to in 1992. It is an international treaty that aims to control the movements and disposal of hazardous waste, including e-waste. Under terms of the convention, it is illegal to export e-waste; however, the growing international black market for electronics waste has led to increasing amounts of e-waste being illegally exported to developing countries under the pretext of a charity donation, or by being wrongly labeled as testing and working when in fact the opposite is true. Readily available processing facilities, low labor costs, and lax environmental regulations and enforcement make shipping e-waste to developing countries such as India, China, and West Africa an attractive solution for unscrupulous traders. As a result, these countries are turning into e-waste dumping grounds. Numerous investigations by environmentalists and regulatory bodies have highlighted that these countries are ending up as e-waste dumping grounds where e-waste is handled in often unregulated and primitive ways. Locals often work in poor and hazardous environments, often with no personal protection against exposure to hazardous components. In an effort to reclaim valuable reusable metals such as copper, gold, and aluminium, methods such as burning and the use of chemicals including cyanide and nitric acid are common.

E-Waste Sources and Problems

Historically, a large majority of e-waste has originated from countries such as the United States, the EU, and China. However, developing countries are experiencing a surge in the amount of e-waste being generated following an explosion in the use of electronics and the continued import of e-waste from other countries. The United Nations estimates that India could experience a rise of 500 percent by 2020 in the number of computers dumped. Implementing e-waste management schemes in developing countries has proven to be problematic for many reasons. Many countries simply lack the infrastructure, investment, and incentive to dispose of e-waste in a safe and environmentally friendly way. The amount of e-waste is growing at such a rate that it is becoming too large to handle. Imports of e-waste from other countries are hampering efforts and leaving developing countries with mountains of waste that are threatening the public health and damaging the environment.

Recognizing a growing environmental problem, Switzerland was the first country, in 1991, to introduce a regulated e-waste program. However, it has been the EU’s Waste Electrical and Electronic Equipment Directive (WEEE), which requires member states to adhere to set collection, recycling, and recovery rates for all types of electrical products and goods, that led the way by introducing the principle of extended producer responsibility (EPR). EPR refers to the mandating of electronic manufacturers to take back products at the end of their life for safe reuse and recycling. EPR follows the rule of the "producer pays" system. It is hoped that this will encourage manufacturers to improve the recyclability of their products by developing more environmentally friendly technologies and reduce the amount of hazardous materials in their products. Despite a global, growing crisis brewing, the uptake of e-waste regulation, with the exception of the EU, has been slow.

Consumers have been slow to recognize the problem that e-waste poses. Consumers' awareness has focused on the use of recover and reuse schemes, thereby preventing e-waste from entering the waste stream and extending the life span of the device. Informing consumers of the correct ways to dispose of their unwanted electronics is seen as a key element in the successful management of e-waste.

E-Waste as a Crisis for Organizations

E-waste can pose a crisis situation for an organization in several ways. The sheer volume of e-waste can increase exponentially, with new technologies constantly evolving. Organizations can find themselves presented with huge stockpiles of out-of-date and unwanted electronic waste. The safe, ethical, and cost-effective disposal of e-waste can prove to be problematic if not implemented or monitored properly. It is important that an organization is fully compliant with local regulations and laws when disposing of its e-waste; this also applies to the contractor tasked with disposal. Before hiring a contractor, it is important that an organization audits and screens its chosen disposal contractor, as improper disposal can have disastrous consequences for both parties, including legal action and negative publicity.

Corporate social responsibility is high on the agenda of many companies that want to be seen doing their part for the environment, and there has been increasing pressure by consumers and environmentalists for companies to adopt environmentally friendly technologies that facilitate effective waste disposal.

The e-waste crisis requires a global solution, and although an increasing number of countries are responding to the crisis by introducing legislation governing e-waste, this needs to be properly regulated and enforced in order for it to succeed. The implementation of EPR, consumer awareness, and clean and efficient recycling facilities are many elements that, combined, can help successfully manage the growing crisis.

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See Also: Electronic Media; Environmental Contamination; Hazardous Waste Disposal; Public Image; Public Relations.

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EM-DAT

Although hazards, disasters, and crises have been occurring for millennia, it has only been during the past half-century that society has become truly interested in assessing and understanding the multifaceted impacts associated with catastrophic events. The need to systematically track and account for disaster impacts had become the central focus of governing bodies across the globe, yet one centralized repository for all disaster losses has yet to be created. Although there are currently many risk, hazard, crisis, and disaster data sets from which research, academia, decision makers, nonprofit organizations, and the general public can draw information, each has been created for a particular purpose and positioned to answer specific questions. Few among the multitude of data sets are recognized internationally as practical for rationalized decision making. Included here is the Emergency Events Database (EM-DAT) from the World Health Organization's Collaborating Center for Research on the Epidemiology of Disasters (CRED). Originally created to support the CRED and the country of Belgium during the late 1980s, the database has been expanded to cover every country in the world and reports disaster loss and impact information for a variety of events in support of relief and recovery operations, poverty alleviation, and health integration in disaster prone areas.

EM-DAT Aims and Attributes

The main goals of the EM-DAT product are decision support for disaster and crisis recovery, hazard mitigation, and as a means by which international aid contributions to disaster areas can be tracked and analyzed. This decision support requirement is met through systematic collection and analysis of disaster impacts on vulnerable populations across the globe. The EM-DAT has been a leader in creating best practices for disaster data collection, database standardization, validation, and analysis and has created a freely available and accessible Web portal from which disaster loss data can be culled. Specific to the EM-DAT is the differentiation between two generic disaster category types: natural and technological. Within the natural disaster category, users will find five subgroups: Geophysical (earth movements), Meteorological (precipitation events), Hydrological (flowing water), Climatological (temperature extremes, drought, and wildfire) and Biological (epidemics). These subgroups are further divided into 12 disaster types and 30 subtypes.

The CRED implements a stringent set of screening criteria beyond the use of classifications in its acceptance of an event into the EM-DAT database. Specifically, a disaster is included in the database only if it meets at least one of the following four criteria: (1) that 10 or more people were reported killed, (2) that 100 or more people were reported injured, (3) that the event resulted in a declared state of emergency, or (4) that the event resulted in a call for international assistance. A final layer of quality assurance/validation includes a triple verification check at the disaster type level (hurricane), the country level (each impacted country), and the source level (entity providing the data—United Nations, national government, nongovernmental organization [NGO], etc.). The resulting EM-DAT database reflects a systematic and consistent data collection and storage process containing accurate disaster impact information at the country level, including a unique disaster number for each disaster event; a country identifier; a disaster grouping, subgrouping, type, and subset; a disaster start and end date; the numbers of people killed, injured, and homeless; the number of people needing immediate assistance; and the estimated amount of damage (in U.S. dollars). Some cases also contain additional information such as detailed geographic information, magnitude and intensity information, international response status, the amount of aid contributions (in U.S. dollars), and information on specific sectors impacted.

In addition to the tabular data available at the EM-DAT, a coordinated effort between the CRED and the Global Risk Identification Program (GRIP) has developed and deployed a Web-based tool for visualizing worldwide disaster data collection initiatives (DISDAT). This portal aims to facilitate access to valuable, often perishable, disaster information from a variety of disaster compilation initiatives.

EM-DAT Reach and Influence

Partnerships and collaborations that apply and extend the use of data products are vital to the growth, applicability, and utility of any database product. The EM-DAT continues to foster and synthesize relationships with many entities operating at local, national, and international scales. Its current set of ongoing cooperative efforts includes a working association with the International Federation of the Red Cross and Red Crescent Societies (IFRC) whereby the CRED produces annual disaster impact statistics and analytics of key trends on natural and technologic hazards. Additionally, the EM-DAT is utilized by the Secretariat for the International Strategy for Disaster Reduction (UNISDR). Here, the CRED produces country disaster profiles and supports statistical/analytic advances under way at ISDR. Finally, since 1999, the CRED and the U.S. Agency for International Development (USAID) have partnered on a process to create, validate, and maintain the EM-DAT database, including the creation of a downscaled regional disaster information system (RE-DAT). The reach and integration of the EM-DAT is evident beyond these global efforts and continues to grow synergistically among many other disaster organizations, including the Asian Disaster Reduction Center (ADRC), MunichRe Foundation (MunichRe), the United Nations Development Programme (UNDP), the Global Risk Identification Program (UNDP/GRIP), the Hazards and Vulnerability Research Institute (HVRI), the Office for the Coordination of Humanitarian Affairs (OCHA), PreventionWeb, the ProVention Consortium, and the World Bank.

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See Also: Collaboration; Crisis, Definition of; Damage Assessment; Decision Support Tools; Disaster, Definition of; Disaster Assessment; Disaster Declaration; Disaster Recovery; Hazard Mitigation; Red Cross and Red Crescent; Vulnerable Populations.

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Emergency, Definition of

The *Oxford English Dictionary* defines an emergency as “a serious, unexpected, and potentially dangerous situation requiring immediate action.” In the field of crisis management, emergencies are events that need a professional response from people who are specially trained and equipped to cope with them. Most emergencies are relatively minor events that can be dealt with in a routine way using resources that are normally available. Minor accidents are typical of such situations. However, a small proportion of them require a qualitative as well as a quantitative change in how situations are managed. These “mass emergencies” include major incidents, disasters, and catastrophes. They are defined by scale, severity, and functional changes in working practices.

It is evident that not all emergencies are disasters, but all disasters are emergencies, as the latter is a much broader and less restrictive term. In major emergencies, normal activities will be suspended in order to devote time and resources to the exceptional activities that the emergency situation renders imperative. These include warning, evacuation, crisis management, mobilization of responders, and monitoring of developments. The objectives of emergency management are to make the best use of available resources, to save and protect lives, to limit damage to property, and to facilitate the process of recovering from an incident or disaster.

Emergencies can occur either as a result of cumulative processes or as the materialization of a sudden threat. Regarding the former, environmental degradation is one process that can occur slowly, perhaps imperceptibly, but once it passes a threshold defined by the gravity of its consequences and difficulty of repairing them, it becomes an emergency. Regardless whether the crisis is a slow-onset or abrupt one, there is usually a need to recognize formally that it has reached emergency proportions and make a decision—possibly a declaration—to begin work in an emergency mode. This involves the suspension of normal activities and assignment of most personnel to tasks defined by the emergency, such as lifesaving activities. The success with which the emergency is managed (i.e., brought under control) depends on command processes, resource levels, and the efficient use of appropriate expertise.

It follows that an emergency is a transient event with a definable beginning and end. It is likely to follow a series of phases (Figure 1). The first of these may be characterized by isolation, in which an impact has occurred but help and assistance are not yet forthcoming. Well-organized crisis management services with good plans know how to minimize this phase by careful monitoring of developing situations and prompt, appropriate reaction. The second phase is one of consolidation. This begins with a large "convergence reaction," in which response units come to the affected area and start work. For life-threatening situations in which people are trapped or injured, it is vital that the responders arrive within minutes or hours and that they reach maximum operating capacity as quickly as possible. In all emergencies, response organizations will probably need to expand their activities and work at or near full capacity.

The consolidation period may merge into phases of recovery and investigation, which will in turn merge into the long-term aftermath in which survivors attempt to rebuild their lives, livelihoods, and physical environments. The recovery phase involves restoring a situation characterized by safety and security, and ensuring that hazards have been abated. The investigatory phase becomes important when "perishable" information needs to be collected, for example, on failures, criminal acts, or cases of negligence. Where culpability needs to be proven, as in terrorist outrages or failure to observe laws, then the site of the emergency is also a "scene of the crime" and responders are charged with disturbing the evidence as little as possible.

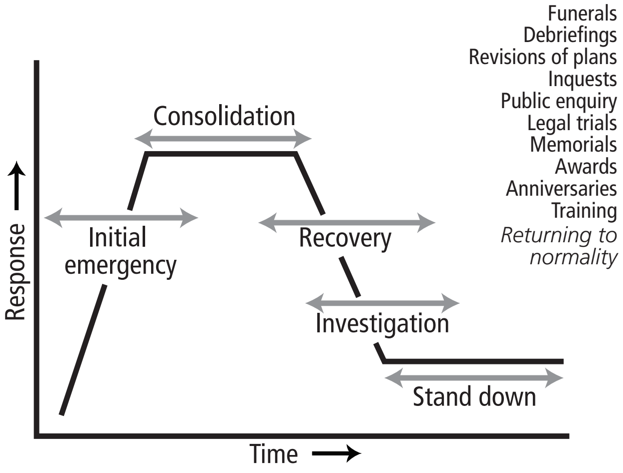

Figure 1 Phases of an emergency

The duration of an emergency depends on several factors. The first of these is the duration or frequency of the causal phenomenon. For example, whereas an earthquake will probably be over within one minute, it may cause entrapment and homelessness that prolong the emergency for days or even weeks. In the days after the main tremors, dangerous aftershocks can exacerbate risk and damage in such a way as to create secondary emergencies. The second determinant of the time scale of an emergency is the ability to respond to it and abate the causes. For example, evacuation is one of the most effective ways of protecting people from violent hazards, but it is only practicable if it is well planned and can be carried out in a safe window of time. Ill-judged evacuation can put people unnecessarily at risk and thus contribute to the state of emergency.

State of Emergency and Emergency Powers

Typically, when a state of emergency is formally declared, responders move immediately into a mode of working that is quite different from their routine activities. Hospitals may be cleared of normal patients in order to receive mass casualties. They may call in extra staff and block routine surgery and diagnostic activities. Emergency operations centers may be opened or obliged to work in a special mode of readiness. Routes may be sealed off, citizens evacuated, cordons set up, and special rules imposed. In democratic societies, it is important that emergency declarations not be used as a cover for abuses of power. Hence, it is vital that the state of emergency be rescinded as soon as possible and normal processes of governance be restored.

Emergency powers may take various forms. They usually involve the temporary suspension of democratic checks and balances, consultation and ratification processes, and normal ways of working on the grounds that all of these are too time-consuming or cumbersome to be appropriate during the emergency, in which decisions must be made rapidly. In effect, the duration of the emergency is defined by the period in which the situation can be managed only by invoking emergency powers, or at least specialized modes of working. Once normal processes can be restored, the justification for using emergency powers disappears.

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See Also: Catastrophe, Definition of; Crisis, Definition of; Hazard, Definition of; Impact, Definition of.

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Emergency Alert Systems

Emergency alert systems (EAS) are mechanisms used to quickly deliver an alert or warning, especially during significant, life-threatening emergencies. These systems are currently used on various scales in multiple settings, including emergency management and monitoring of school performance, among many others.

There is a large difference between early warning systems (EWS) and EAS. EWS are comprehensive risk-reduction mechanisms that encompass four components: (1) risk knowledge, (2) monitoring and forecasting, (3) warning dissemination, and (4) response capacity. In contrast, EAS only cover the warning dissemination component. Even if not as integral as EWS, the EAS are important tools for crisis management. An effective EAS ensures that both threatened people and crisis managers receive a timing alert that allows them to react preventively and protectively before the crisis. This may help save multiple lives and decrease the damages.

National Emergency Alert System

The best-known EAS is the national Emergency Alert System of the United States of America. The system, based on media communications, is designed to transmit emergency alerts to the public at national, state, and local levels. In addition, the EAS enables the president of the United States to address the American public during national emergencies. Each state and several territories have their own EAS plans describing the procedures to deliver state and local alerts to the EAS. Nowadays, three types of alerts are issued using the EAS: alerts issued by the president, alerts involving imminent threats to safety of life, and AMBER Alerts (America's Missing: Broadcast Emergency Response) for child abduction emergencies. Since its implementation, the EAS has been repeatedly used by state and local emergency authorities to transmit emergency alerts to the public, for events such as tornadoes, gas leaks, and child abductions.

The EAS was created in 1994 by the Federal Communications Commission (FCC) and was preceded by two national alerting systems: the Emergency Broadcast System (EBS), created in 1963 during the Cold War and the threat of nuclear warfare, and CONELRAD (Control of Electromagnetic Radiation), a military alert system created in 1951. The EAS is jointly coordinated by the Federal Emergency Management Agency (FEMA), the FCC, and the National Oceanic and Atmospheric Administration (NOAA).

The EAS works as a hierarchical alert message distribution system that involves several communication media called EAS Participants. These include different types of television and radio broadcasters. All EAS Participants are required by the FCC to have EAS equipment installed to be able to transmit EAS alerts. An authorized person at the local, state, or national level may input an EAS alert into the system using the specific encoding equipment. Then, designated highly resilient stations, known as Primary Entry Point (PEP) stations, broadcast this alert to the public in their listening areas. Other EAS Participants monitor the

PEP stations and retransmit the alert to the public in their listening areas. These stations are monitored, in turn, by other EAS Participants. Each EAS Participant or broadcaster must monitor at least two EAS sources. FCC rules also require broadcasters to monitor at least two independent sources for emergency information, ensuring that emergency information is received and delivered to viewers and listeners. This alert transmission system is commonly referred to as a daisy chain.

Following the FCC's rules, messages in the EAS comprise four parts: (1) a digitally encoded Specific Area Message Encoding (SAME) header, (2) an attention signal, (3) an audio announcement, and (4) a digitally encoded end-of-message marker. The SAME header contains information about who originated the alert (the president, state or local authorities, the NOAA, or the broadcaster); a short, general description of the event (tornado, flood, severe thunderstorm); the areas affected (number of counties or states); the expected duration of the event (in minutes); the date and time it was issued (in UTC); and an identification of the originating station. The following attention signal lasts between 8 and 25 seconds, depending on the broadcasting station. Then, the attention signal is followed by a voice message describing the details of the alert. The message ends with three bursts of the "End of Message." In addition to the audio messages transmitted by radio stations, television stations must also transmit a visual message. Scrolling text is displayed at the top of the screen that contains all of the information encoded in the initial SAME header. A color-coded text scroll system is often used where the color signifies the priority of the message.

Integrated Public Alert Network

Nowadays, the EAS is part of a larger and more comprehensive national system of communication called the Integrated Public Alert Network (IPAWS). This system aims to expand the traditional EAS to incorporate more modern technologies including digital systems.

IPAWS is planned to diversify and modernize the EAS, while consolidating all emergency alerts into a single notification system with a common message format. The components of IPAWS include the EAS, focused on radio and television, and the Commercial Mobile Alert System (CMAS), also known as the Personal Localized Alerting Network (PLAN), still in the process of implementation, focused on sending text messages to cell phones and pagers considering specific geographic areas through cell towers. To achieve sending the alert to multiple media, IPAWS will use a new coding protocol called Common Alerting Protocol (CAP), which is in the process of implementation and will replace the SAME. The CAP is a digital text-based message format that uses XML (eXtensible Markup Language) for exchanging emergency alerts. Using the CAP will enable the alert message to be sent through all available means of communication, including cell phones, Internet messaging, pagers, road signs, land lines, satellites, and television and radio.

To help ensure EAS readiness, the FCC mandates that EAS tests be run weekly at the state level and monthly at the local level. The weekly test consists of the header and the end-of-message SAME bursts. The aim of these tests is to ensure operability, identify any potential issues that may arise, and develop solutions to address them on an ongoing basis.

A first national test was attempted on November 9, 2011. The test was aired on every broadcast, cable, and satellite TV station in the nation, as well as every AM, FM, and satellite radio station. But it was not sent to landline or cell phones, pagers, or computers. This is expected to change when the CMAS is fully implemented. Some stations reported that some of their receivers were not able to relay the test. The message may also have lacked the alert code that would allow the president to speak. Because of a feedback loop in the PEP system, the test could be heard several times in the background, and the End of Message code was sent twice, as opposed to three times, violating EAS rules. The test was cut down to 30 seconds from the proposed three minutes.

Criticism and Potential

The EAS has been strongly criticized; the value of a warning system at the national level is especially questioned. Nowadays, the community acknowledges that it has improved much, although there are still many aspects to enhance.

Even if the EAS is improved to ensure prompt message delivery to all concerned people, those people must know how to react appropriately or the system will fail. According to Dennis Mileti, former director of the Natural Hazards Research and Applications Information Center at the University of Colorado at Boulder, for people to respond to the message, it has to include a clear reference to who is the message provider, who must be someone trusted and believed; be delivered over multiple and different communications channels; be repeated frequently; tell people what to do, where to go, which protective actions are required, and when and until when they need to take them; explain why protective action must be taken, telling what the hazard is and what the consequences are from exposure to it; be kept simple, unambiguous, accurate, and authoritative; and finally, be consistent and noncontradictory.

The success of the EAS depends on strong partnerships between alerting authorities and alert disseminators. It is also important that federal agencies work closely in cooperation with state, territorial, local, and tribal governments to ensure this tool is used properly and effectively during extreme emergency situations. Finally, government officials (emergency management), broadcasters, and emergency responders must work to ensure the system is effective, and have local and state plans ready to support protective actions.

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See Also: Agency Notification and Mobilization; All-Hazards; Coordination; Crisis Communications; Crisis Simulations; Disaster Declaration; Disaster Drills; Early Warning Systems; Emergency Management Agencies, City and County; Emergency Management System; Emergency Public Information; Exercises; Federal Emergency Management Agency (FEMA); Mass Media; News Media; Operational Plans; Preparedness; Public Awareness and Education; Training; Uncertainty; Warning.

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Emergency Management, Principles of

Emergency management emerged in the United States following the Cold War era with the intention to protect people from nuclear attacks, but the occurrence of numerous disasters led to creating an emergency management system that is inclusive of all hazards. With increasing numbers of hazards and their severity, emergency management now embraces risk reduction, social vulnerability, and technocratic approaches; it is designed to protect social and physical environments from the impacts of natural and human-made hazards and to aid communities to respond to and recover from disastrous consequences while also preparing to mitigate impacts from future emergency events. Now every country in the world has an emergency management system comprising four phases—preparedness, response, recovery, and mitigation—and eight guiding principles: comprehensive, progressive, risk-driven, integrated, collaborative, coordinated, flexible, and professional.

Emergency Management

An emergency, according to the Webster's dictionary, is a situation resulting from unforeseen events that requires immediate action and attention. Emergency management, as the name suggests, is management of an emergency situation. A disaster is an event disturbing the functions of a community or society, resulting in human, environmental, and financial losses that exceed the ability of the affected community to cope with, using its own resources. The different types of emergencies resulting from a disaster are danger to life, property, and health of people in affected communities, and to the natural environment and ecosystem, for instance, the loss of barrier islands during a hurricane, which act as barriers to storm surge. In

Page Boesl (left) and her daughter fill sandbags at the Sertoma Sports Complex in Minot, North Dakota, June 23, 2011. Using the principle of collaboration, thousands of residents fought the Souris River flood with federal, state, local, and tribal partners.

case of a disaster, emergency management includes all managerial functions responsible for creating a framework within which communities and stakeholders work to cope with the impacts of the disaster and which increase resilience of susceptible and affected communities to future disasters.

Historically in the United States, emergency management originated after World War II in response to the Federal Civil Defense Act of 1950 to address civil defense activities and reduce Cold War tensions. The main disaster that was the focus of emergency management then was threat of nuclear attack. After the modification of the Civil Defense Act in 1958 and following the disasters of the 1960s, especially the earthquake near Hebgen Lake, Montana (1959), and Hurricane Donna (1960), emergency preparedness functions to deal with natural disasters were included with civil defense activities. This led to the creation of a new emergency management concept—a system embracing an all-hazards approach with the goal to protect the public in all kinds of emergencies. Being an all-hazards approach, the current emergency management, as defined by the Federal Emergency Management Agency (FEMA) Higher Education Project, is a risk-based collaborative and coordinated approach implemented by all stakeholders with the intent to protect life, health, property, environment, and economy of communities impacted by a disaster. The mission of emergency management is to aid communities to increase their ability to reduce adverse impacts of a hazard and to increase their resilience and sustainability to prepare for, respond to, and recover from natural or human-made disasters. The current version of emergency management system comprises four phases and eight principles to address the needs of communities in case of a disaster and adapts an integrated/collaborative approach among stakeholders.

Phases of Emergency Management

The four phases of emergency management—mitigation, preparedness, response, and recovery—are linked together in a cyclical manner so that effective and efficient emergency management activities can be implemented before, during, and after a disaster to ensure the impacted communities' return to their life before the disaster occurred. A discussion of the activities and goals of each phase follows.

Mitigation: This phase can happen anytime, as it includes actions to reduce the chance of an emergency happening and the extent of its damaging effects on citizens and businesses. Because the intention is to reduce the devastating effects of an emergency, this phase should be implemented long before an emergency happens. Some of the activities that should be undertaken include implementing structural guidelines/building codes to maintain safety of a structure against fire or hurricane wind/storm surge impact. Such activities include elevating houses beyond the maximum flood limit, buttressing roofs/doors/windows to protect from wind impacts, implementing land use codes to protect future urban growth (e.g., restricting construction in flood-prone areas), and purchasing insurance (fire/flood) to cover financial effects of a future emergency.

Preparedness: This phase, which also happens before an emergency occurs, involves preparation of plans and other activities by emergency management agencies, the general public, and other stakeholders to aid communities in dealing with an emergency situation. Some of the activities in this phase include the following:

- Preparation and implementation of emergency and evacuation plans: these plans help identify actions agencies need to take in case of an emergency. Evacuation plans help identify the best shelters and routes to be used to evacuate people and animals from the emergency impact zone.
- Holding disaster drills and public education: these activities are geared toward communities with the intention to help them understand the sequence of events and actions they have to take before, during, or after a disaster to protect themselves and their families and friends.
- Preparing a disaster kit containing food, water, emergency lights, and other such necessities to help families.

Response: This phase occurs during an emergency. The goal of this phase is to protect lives and prevent damage to properties from a disaster. One major action of this phase is implementing identified preparedness activities during an emergency. Therefore, for the success of this phase, it is required for all agencies involved in this process, from local to federal as well as communities and community-based organizations, to work in a collaborative and coordinated manner. Some of the actions in this phase include:

- Warning and alert: alerting the public, if possible, before the occurrence of a disaster (e.g., warning the public in coastal communities before a hurricane makes landfall so that actions to evacuate in a timely manner to available shelters can be taken, or warning the public during a tornado to take shelter in an enclosed space identified to protect from a tornado, such as the basement of a house).
- Implementing other preparedness actions during an emergency.

Recovery: This phase begins immediately after an emergency or a disaster has ended. The goal of this phase is to help communities get back to their normal routine. Activities in this phase also include building a safer situation after the emergency to cope with changing environments and future events. Actions in this phase include removal of debris, repair and rebuilding of structures/infrastructures, provision of financial aid through insurance companies to help businesses recover as well as impacted citizens to rebuild their structures/get employment, and providing special assistance programs to impacted people to recover from their health and psychological trauma. The duration of the phase can be a few hours (e.g., a roadside accident) to several years (e.g., an event like Hurricane Katrina) to recover from the devastation. However, the longer the recovery phase, probably the more difficult it is for people to get back to normalcy, because the surrounding environment undergoes numerous changes.

Principles of Emergency Management

Principles include underlying guidelines for effective management of an emergency universally. The eight principles of emergency management are as follows:

Comprehensive: A jurisdiction encounters a number of natural and human-made hazards; it is pertinent to identify all hazards and prioritize them based on the likelihood of their occurrence using historical data. Although one set of actions can be used to address any hazards, all hazards are different in their occurrence and impacts, and therefore require different management activities. Identifying all hazards will help in the risk assessment process to prepare plans specific to disasters, including solutions to deal with all possible adverse impacts in all phases of emergency management. The plans should also identify all stakeholders, in both public and private sectors, to ensure coordination and collaboration of actions for effective management of a disaster, for faster response and recovery, and for effective mitigation. Therefore, emergency management should be comprehensive, which means it should take into account all possible implications of all hazards, all stakeholders involved and impacted by the disaster, and all actions to be implemented at all phases.

Progressive: Hazards are becoming frequent, severe in their magnitude, and devastating in their impacts on society and environment. It is therefore pertinent to predict the possible future impacts of a disaster and spatial distribution of impacts to identify vulnerable locations and populations that will need aid so that effective plans and actions can be prepared to mitigate future impacts. These requirements necessitate emergency management to be progressive in its approach so that emergency managers and emergency management actions will be preventive and preparatory to build a resistant, resilient, and sustainable community.

Hence, emergency management now implements a prevention and risk reduction approach focusing on risk assessment and management, a social vulnerability approach focusing on reducing vulnerability and increasing resilience and sustainability of communities, and a traditional approach focusing on management of all hazards.

Risk-driven: The goal of emergency management is to reduce risk to protect lives and properties by using available resources in an effective and efficient manger. Hence, it is required to formulate and establish policies and activities for emergency management based on assessed risk from all possible hazards to locations, people, properties, businesses, and the natural environment. The risk assessment approach is predictive and proactive in nature as it tries to determine potential damages and losses that the social and physical environments will experience from future hazards.

Integrated: Although a disaster and its adverse impacts are local in nature, in order to cope with the emergency situation and increase future resilience of impacted communities, the management actions are shared among private and public stakeholders at every level of government: local, state, tribal, federal, and community. Because of the involvement of so many stakeholders, their participation in the decision-making process at every phase is required to make the efforts more coordinated and effective. Therefore, it is necessary to develop a framework that is both top-down and bottom-up in its implementation and integrates the principles and effective practices between different levels of government and within each government agency at each level to develop an effective emergency management routine that is adaptable to the situation, rather than generic.

Collaborative: Because of the participation and involvement of a number of stakeholders from public and private sectors and the impacted communities, it is essential for the participants to collaborate with each other, which will help emergency managers work as a team by pooling resources for effective implementation of emergency actions. The goal of this principle is to encourage a culture among emergency managers that will encourage trust—a team atmosphere that will facilitate communication and build consensus.

Coordinated: Because of the involvement of numerous agencies and stakeholders with different goals and missions, and headed by different personnel, coordination requires these agencies to agree upon a common mission, that is, effective management of a disaster and its societal and financial impacts. Coordination also ensures that the role of each stakeholder in the overall picture of emergency management is identified and recognized by the emergency managers and all involved stakeholders/agencies/agency personnel. The main goal of coordination is to pull together the available resources of all involved agencies and organize the implementation of emergency management activities by assigning the activities and resources to emergency managers.

Flexible: Emergency management is comprehensive, which means that a one-for-all approach comprising a common set of activities will not be effective and applicable while dealing with a disaster. Likewise, because of the diverse nature of responsibilities of emergency managers and participating agencies/institutions, policies guiding emergency management need to be flexible to allow participants to perform a task suitable to an emergency situation irrespective of the said participant's original task delegation. In a nutshell, the framework and policies of emergency management should allow emergency managers and other participants the flexibility to choose an action and/or policy or devise a creative and innovative activity that is not only problem-based in nature (dealing with a specific disaster) but also place-based (tailored to address the needs and issues of the local community impacted by the disaster).

Professional: Scientific, knowledge-based, and innovative approaches are used to develop solutions/activities to deal with emergency situations and adverse impacts of disasters of communities. It is, therefore, required for emergency managers to have the requisite experience and standards to achieve the final goal of protecting lives, property, and the environment. In addition to having professional attributes, emergency managers must follow a code of ethics, standards and practices, training, professional experience, and education, and be board certified and part of a professional association.

Participants and Players

All disasters happen at a community/local level. However, it is possible for local communities not to have access to all resources required to deal with an emergency situation. Therefore, emergency management relies on numerous stakeholders at different scales with the intention of community capacity building, which eventually will lead to building disaster-resistant and resilient communities. Some of the stakeholder agencies include the fire department, local law enforcement, health agencies, the Red Cross, the weather service (providing warning before an emergency), planning department, local/state/federal emergency management agencies, department of transportation, local schools/churches, community-based organizations, and private sector. The major actors are emergency managers: people with the ability to identify the main goals and possible solutions and to coordinate and collaborate with other stakeholders to achieve these goals. No matter the extent of aid an emergency manager can provide, emergency management actions cannot be effective without the participation of the local public, whose participation in the decision-making process and the different phases of emergency management is essential for the success of both emergency management and successful recovery of impacted communities. Thus, the second major players are citizens impacted by a disaster and they are at the grassroots level of emergency management.

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See Also: Crisis Management, Emerging Trends in; Disaster, Definition of; Emergency Management Agencies, City and County; Emergency Management System; Emergency Manager; Emergency Responders; Federal Emergency Management Agency (FEMA); Hazard, Definition of; National Preparedness Goal; Preparedness; Recovery; Response; Risk Assessment; State Emergency Management Agencies.

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Emergency Management Agencies, City and County

Local emergency management agencies—those organized at the city, town, county, or parish level and funded by and answerable to that local government—are typically the first agencies to respond to most emergencies, whether directly or through the coordination of local government resources. Many emergencies, including chemical spills, traffic accidents, structure collapses, fires, animal threats, and many weather emergencies, occur only on the local level and are best handled by local agencies that have both proximity and relevant familiarity. Other emergencies may require the attention of state or federal authorities, either for jurisdictional reasons (the federal government deals with terrorist attacks), the need for specialized competencies (the Centers for Disease Control and Prevention and other agencies have resources for dealing with infectious disease that go far beyond those of local agencies), or because the emergency transpires across multiple geographical jurisdictions. Wildfires, for instance, will frequently spread beyond the town in which they started and may transcend state lines as well as local boundaries. Major weather events like hurricanes, blizzards, and droughts are rarely confined to a small area. In these cases, multiagency cooperation is typical, with oversight and funding provided at the state and federal levels while local agencies do most of the footwork and contribute local expertise.

An emergency management agency oversees the response to an emergency and coordinates the efforts of the police department, fire department, emergency medical personnel, public works department, specialized rescue services (such as wilderness or mine rescue crews), hazmat teams, public utilities, social services, and other agencies with the resources and jurisdiction to respond. In addition, emergency management agencies are typically responsible for preparedness, mitigation, and public information, though these functions have a history of being downplayed in smaller jurisdictions because of budgetary priorities. The size, scope, and resources of a local emergency management agency vary greatly from jurisdiction to jurisdiction, and there is a historical relationship between emergency management and civil defense. New York City, for instance, has the Office of Emergency Management (OEM), a descendant of the Office of Civilian Defense established during World War II. The OEM's director reports directly to the mayor, and its headquarters is a four-story building housing offices for its staff, conference rooms, the emergency operations center, and briefing rooms for the media. The OEM's watch command, staffed round-the-clock every day of the year, monitors police and fire department activity and the 911 system, and it dispatches OEM responders as needed.

New York City, of course, has a population larger than most states. Although many other large cities, such as Boston, Seattle, and Chicago, have relatively large offices of emergency management, in smaller locales the office or its equivalent functions mainly as a liaison between the mayor and an emergency planning committee. Nashua, New Hampshire, the second-largest city in northern New England with a population of about 100,000, is a representative example, albeit one a bit more affluent than average.

Emergency Management in Nashua

In Nashua, the OEM coordinates city departments in the handling of disaster response and is the lead point of contact in nonpolice, nonfire emergencies. It is tasked with overseeing communications, transportation networks, infrastructure, and the flow of public goods and services during an emergency, as well as with the city's mitigation and preparedness. The OEM drafts the city's Comprehensive Emergency Management Plan, which details the actions and responsibilities of various agencies and departments in the event of an emergency, and runs the emergency operations center (EOC) during such emergencies. It is responsible for requesting assistance from other cities, or from the state or federal level, though in the latter case the request generally comes from the mayor.

The OEM develops the staff for the EOC and the internal procedures used to authorize emergency operations and is responsible for coordinating with the New Hampshire State Emergency Management Agency, as well as keeping the state up-to-date on damage assessments and other critical information. It is responsible for local alert systems for officials, procuring emergency communications equipment, coordinating public information programs, coordinating with medical personnel including hospital staff and doctors, establishing a shelter system that is compatible with the city's transportation resources, coordinating with volunteer groups like the Red Cross, and applying for matching funds from state and federal programs for emergency management funding. It also coordinates training programs for the public, for city officials, and for city departments.

The Nashua OEM operated the city's emergency operations center from October 29 to November 4, 2011, when the Snowtober nor'easter caused the third-largest power outage in the state's history, and the agency continued to oversee debris management through the subsequently mild winter until February 7, 2012. The response team consisted of the mayor's office, Nashua Police Department, Nashua Public Works, Nashua Public Health and Community Services, Nashua Fire Department, Nashua Information Technology, Nashua School District, Nashua Transit System, Nashua GIS, New Hampshire Red Cross, Southern New Hampshire Medical Center, St. Joseph Hospital, and Public Service of New Hampshire (the local electricity provider). Nashua North High School was used as a public shelter for a week, offering showers, hot meals, and access to electricity to those who had other places to stay, as well as overnight accommodations for those who did not. Functional needs support was offered to a greater extent than the city had been able to previously provide, and most of the residents who spent a week at the shelter made use of that support. The debris management program, restructured in the aftermath of the 2008 ice storm, which had left some parts of the city without power for weeks, was one of the largest in the city's history.

The example of Nashua and its actions during the Snowtober storm demonstrate the extent of an OEM's involvement in a jurisdiction too small to support an emergency services agency with a large full-time staff and dedicated resources, as would be found in Boston or New York. Key to the OEM's approach is organization and planning, which requires only manpower and appropriate core competencies. The resources of other city agencies, like the police and fire departments, and of the city's medical facilities can then be put to the most effective use.

Many city and county agencies have mutual aid agreements with one another, under which neighboring locations (or occasionally, separate agencies in the same jurisdiction) will lend resources and personnel to one another in response to an emergency. Calling for mutual aid is the decision of the incident commander. Mutual aid or reciprocal agreements are especially common with fire departments; the low frequency of serious fires makes maintaining a large firefighting staff and fleet an expensive proposition for a small town but also makes it likely that when a serious fire is occurring in one town, a neighboring town will have idle resources available. Such agreements therefore let towns spend less money on firefighting without seriously increasing their vulnerability to fire. Along the Canadian-U.S. border, there are international mutual aid agreements, involving both American and Canadian towns.

Even with mutual aid agreements, emergency management is a particular challenge in rural areas where the nearest town may be too far away for responders to arrive in time. Sparse populations contribute less human and financial capital, they exact a higher per-person cost for communications and other resources, and solutions to rural emergency management tend to focus on social capital—community organizations, the participation of local businesses whose interests are at stake, and volunteer labor. Volunteerism is generally higher in rural areas than urban ones; in some towns, local fire departments are staffed partly or entirely by volunteers, who are summoned from work or home to respond to fires.

California's Emergency Management

State law may dictate minimum standards of emergency management services at the local and county levels, as well as providing funding, resources, or structural support. The California Emergency Services Act, for instance, dictates the Standardized Emergency Management System (SEMS) for managing multiagency emergency response throughout the state of California. All state agencies are required to use SEMS, which incorporates the Incident Command System, interagency coordination, and the California Disaster and Civil Defense Master Mutual Aid Agreement, which dictates reciprocal agreements among jurisdictions. SEMS establishes an organizational framework for the response of emergency management agencies and for the integration of multiple agency responses. Local governments are required to use SEMS as a requirement of eligibility for disaster assistance and personnel funding from the state, and must maintain minimum SEMS training competencies, though they are not held to the same standards as state agencies. The prevalence of wildfires in California—which, if not properly dealt with by one jurisdiction, can quickly spread to others—was a strong factor in the passage of the Emergency Services Act, which was proposed after the East Bay Hills Fire of 1991.

The Incident Command System used under SEMS was developed by the Fire Fighting Resources of California Organized for Potential Emergencies (FIRESCOPE) program. Several key positions are defined and are filled by various local government officials as appropriate: the incident commander, who oversees the response to the disaster; the operations section chief, who oversees a specific section of operations; and the public information officer, who is the only designated media contact, charged with coordinating media relations and providing information about the ongoing disaster and the government's response. Ideally, there is a ratio of workers to supervisors of between 5:1 and 7:1.

SEMS also uses the Operational Area Satellite Information System (OASIS). The operational area consists of a California county and all its political subdivisions. Under SEMS, when a disaster occurs, the incident commander works with the planning section to draft an action plan identifying the agency's operational period and goals. The incident commander is a local government official, designated by the agency. SEMS is a scalable system. It's usable for five levels of emergency response: state, regional, operational area, local, and field levels. Emergencies that grow in severity or scope activate higher levels of response. At each level, SEMS identifies units responsible for operations, planning and intelligence, logistics (including personnel procurement, communications, transportation, and supplies), and finance/administration, each of which is further subdivided.

The operations unit, for instance, includes firefighters, law enforcement personnel, a medical unit, an environmental health unit, a unit providing care and shelter, and perhaps a separate animal services unit or other units needed in a specific emergency. For instance, in emergencies that call for an animal services unit, that unit is overseen by a branch director (or incident commander, if the unit is the sole operations unit) overseeing a planning group with teams assigned to resource control, emerging issues, and history (photo and video documentation); a logistics group with units devoted to communications, volunteers' coordination, and animal transport (including trailer crews, roadblock facilitators, a maps and logistics officer, and a support unit for the staging area); and an operations group, including medical aid (separate human and veterinary units), security, and facilities (including animal identification, housing, and sanitation/feed units).

Handling Evacuations

One of the tasks local agencies may have to take on is evacuation. Buildings and other small areas are evacuated during fires in order to mitigate exposure to risk and may also be evacuated because of damage from earthquakes or storms, chemical hazards, and human-made hazards. When police in 2012 investigated the home of alleged Aurora, Colorado, mass shooter James Holmes, they evacuated the surrounding area until the bombs he had set could be disarmed. Public places and transit may need to be evacuated in response to a bomb threat or suspected terrorist threat, a decision that may be made by state or federal authorities but is generally carried out by local agencies. Evacuations are also carried out in advance of hurricanes, wildfires, and tsunamis, and these evacuations are generally for a longer period, often requiring evacuees to remain away from the area for days, which may in turn require authorities to provide emergency shelters and provisions. The summer 2012 wildfires in Colorado required more than 35,000 residents to be evacuated by August; such evacuations require some amount of postevacuation monitoring of the affected area, as even residents who leave willingly may attempt to return before it is safe. Evacuations are rarely carried out in response to blizzards, but the need to provide food, shelter, and communications for a population displaced by structural damage or power outages encompasses a similar level of resource commitment as an evacuation.

When the affected area is large enough, evacuations may be issued by zip code rather than by neighborhood, which helps eliminate ambiguity and prevents the possibility of residents being left out of an evacuation because of a misunderstanding or geographic uncertainty. (Definitions of neighborhoods may vary widely and subjectively, and evacuation orders such as "all homes north of Central Street" may be unclear in locations where streets are not laid out in an orderly grid.) Communication among emergency workers is important during an evacuation, and ham radios are preferred because they are not dependent on cell phone towers, but it is even better to provide redundancy in communication options, so that if one option fails, another is available.

In some disasters, the evacuation process can be the most important part of hazard mitigation. In 2005, Hurricane Katrina's impact on the New Orleans area was exacerbated by the failure of the levees, but the human impact of the disaster was exacerbated by the handling of the evacuation. Authorities delayed in calling for a mandatory evacuation (in part because of the vagaries of predicting a storm's track, in part because of the expense required of such a declaration, which obligates government action), and by the time a mandatory evacuation order had been issued, it was given on short notice. Nearby motels in the safe zone were already occupied by people who had evacuated during or before the voluntary evacuation period, and these people were typically better off than those who remained, because of the expense of evacuating and leaving work. Therefore, those who did not leave until the mandatory evacuation period had farther to travel and more to pay in order to find safe lodging. In addition, not everyone had their own transportation with which to evacuate, and the transportation

Remembers
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A young boy is lifted to safety by first responders after his family lost everything in the flooding caused by Tropical Storm Erin in Kingfisher, Oklahoma, August 18, 2007. Because of their proximity and relevant familiarity, local first responders—city and county agencies—are the first to bring aid and comfort to victims following large-scale disasters, which would then require the additional response of federal agencies. Many other emergencies occur only on the local level and are best handled by local agencies.

provided by the government was insufficient, poorly organized, and poorly communicated.

Beyond the direct mishandling of the evacuation, however, human factors exacerbated emergency workers' task because of hurricane fatigue. New Orleans is in a part of the Gulf Coast that is subject to several hurricane warnings and watches a year. Most of the evacuations in recent memory had proven to be unnecessary. If there was clear information that Katrina would be a more serious storm than those of the previous decade, it wasn't effectively communicated—as evidenced by the surge in evacuation activity after the television appearance of the director of the National Hurricane Center, Max Mayfield, urging people to get to safety. Better oversight and integration of local, parish (county), and state agencies can in theory improve the handling of such situations. In the aftermath of Katrina, it was clear that so many things had gone wrong, in so many spheres, that blame was easily spread around.

Emergency agencies also need to have specific plans in place in order to evacuate schools, colleges, hospitals, and nursing homes. Often these institutions will develop their own plans, with hospitals maintaining a skeleton crew to care for patients who cannot be moved off-site. However, these plans should be integrated with the operational area's larger plan, and local authorities should remain informed about which hospitals (for instance) remain open for intake, which are operating but only have the resources to continue care for the patients they already have, and similar concerns.

Communicating information during an evacuation or any other emergency must be done with some thought to the effect the information will have. Broadcasting the locations of shelters, for instance, will result in those in need seeking the closest shelter—but if the shelters are not distributed evenly throughout the affected region, it will lead to overcrowding and insufficient resources in some shelters, while others will have empty beds. When possible, local agencies are better served by directing people to specific shelters in order to put resources to their most effective use.

Using Social Media

Local agencies are increasingly using Twitter and other social media to communicate everything from serious concerns to minor traffic snarls. The obvious drawback in using these media is that most residents are unlikely to be paying attention to the social media accounts of their local government agencies until they know something is wrong. Unlike an emergency alert on television, social media announcements do not interrupt the audience's other activities, but require that people opt for access to them, with the advantage that during power outages and other circumstances in which traditional media are difficult to access, social media may still be available via users' phones. Again, redundancy is key; Twitter should not be relied upon solely, but television and radio announcements, through public service announcements (PSAs) or the news media, can make the public aware of these social media resources.

A mobile or social media analogue to the emergency broadcast message has not yet caught on, but the Commercial Mobile Alert System (CMAS), developed by the Federal Emergency Management Agency's Integrated Public Alert and Warning System office, may fill that niche. The system was developed in response to the growing reliance on cell phones and abandonment of landline phones. Cell phones that are enabled to receive wireless emergency alerts (WEA) receive text messages sent by state, local, or federal emergency managers or the National Weather Service. Of the three types of alerts, cell phone users may choose not to receive Amber Alerts and disaster alerts, but they cannot opt out of presidential alerts. Instead of relying on area codes or exchanges to target a specific geographic area, as a landline-based system does, CMAS sends messages to those cell phones in range of the cellular towers in the relevant area, allowing for very specific geographic targeting. CMAS is not in widespread use, and local agencies must complete training courses in order to be certified in and authorized to use it. As of 2012, most Americans did not possess a WEA-enabled phone, but the frequent turnover rate of cell phones means that the majority of middle- and upper-class cell phone users are expected to have WEA-enabled phones by 2015.

New York City has gone the furthest in implementing the system, with the four major carriers (AT&T, Sprint, T-Mobile, and Verizon) engaged in initial tests; CMAS has not been used during an emergency since being rolled out. San Diego, California, has adopted the system as well, and other cities are expected to follow; the system is most useful in affluent areas, where much of the population owns and carries a cell phone. One of the difficulties the system has to overcome is the 90-character limit on its messages, about two-thirds of Twitter's 140 characters. A San Diego test message read "TEST: Toxic air quality near Mission Bay. Remain indoors. Turn off AC. Monitor local news," which conveyed a lot, but reservations remain about the character limit. Uniform resource locators (URLs) aren't used, despite the increasing popularity of smartphones, because data networks could be overloaded by too many people loading a Web page during a crisis. Similarly, too little information could lead to network overload as users call people looking for more information.

Social media can be effective not only in communicating during a crisis but also in community preparedness, risk mitigation, and safety advocacy. PSAs have long been used to communicate safety information about hazards such as downed power lines, digging where power lines might be located, or the dangers of falling bullets when holidays are celebrated with gunfire, as well as popular children's safety campaigns like the "Stop, Drop, and Roll" fire safety campaign. Social media can provide an extension of these campaigns and communication efforts. Furthermore, the use of social media fills the gap that is left as participation in community groups continues to decline.

Local agencies using social media should assign the task to someone already savvy with the technology and sensitive to the often bristly nature of the Internet. On Twitter, hashtags can be helpful to assist in users' searches for information, especially if the social media officer pays attention to online activity and can use a hashtag already in use by the public. Online videos can convey some kinds of information better than other forms of media, especially when instructing the public in emergency preparedness. Twitter-based "town hall meetings" have become increasingly popular as well and may attract participants who would eschew the trouble of an in-person town meeting.

Twitter and other social media are invaluable for "crowdsourcing," or assigning citizens to disseminate information during a crisis. Although this information should be received with a grain of salt, the public may be able to provide information about damage from an ongoing disaster more quickly than local agencies sending workers out to survey the scene. Agencies ignoring this information will look especially bad in the aftermath.

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See Also: Agency Notification and Mobilization; Air Traffic Control; Blame, Politics of; Bridges; Bureaucracy; Cabinet Office, UK; Civil Protection; Contingency Planning; Continuity of Government; Crisis Management, Emerging Trends in; Crisis Simulations; Department of Homeland Security (DHS); Disaster Declaration; Disaster Declaration Officer; Early Warning Systems; Emergency Alert Systems; Emergency Medicine; Emergency Operations Center; Emergency Public Information; Emergency Responders; Emergency Support Functions; Hospital Emergency Room; Incident Management; Incident Response; Incidents Versus Crises; Infectious Disease; Reciprocal Agreement.

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Emergency Management System

An emergency management system defines policies, procedures, and responsibilities for emergency management, including preparedness, mitigation, disaster response, and dealing with the aftermath of emergencies. A management system defines an organizational framework in which activity occurs—a framework in which, typically, interagency response is integrated, special procedures and responsibilities are defined, and methods for evaluating performance are established (based on the determination of goals and the preparation of after-incident reports based on those goals). Predetermining procedures and responsibilities streamlines the emergency response, as well as identifying in advance which resources will be needed in the event of various emergencies. Frequently, emergency management systems create temporary teams and hierarchies designed to deal with the emergency at hand, mobilize personnel from various agencies, and sometimes seek help from the private sector (especially medical personnel) and from volunteers (particularly via agencies like the Red Cross).

Historically, emergency management was a neglected aspect of the discipline of public administration, and it was left—explicitly or by default—to law enforcement agencies and fire departments, with contributions from public health organizations. Serious preparedness, and the maintenance of resources and personnel that would, ideally, be called upon infrequently, was an economic commitment too few communities were willing to make, and elected officials and voters alike regularly favored short-term gains over long-term thinking, an attitude that also exacerbated risk exposure in coastal, floodplain, and wildfire-prone areas. Emergency management remained focused principally on reacting to crises.

The creation of civil defense organizations, especially during World War II, did little to change this in the long term but did create some of the ancestral organizations of later emergency management organizations. Where emergency management organizations did exist, they were typically poorly funded and married to technology that soon became obsolete, as ongoing funding was rarely sufficient to replace, upgrade, or maintain the equipment that had been purchased with initial grants. This occasionally led to inefficient, even inept, handling of major disasters beyond the purview of the police department, such as public health crises or natural disasters. Problems arose when the agencies with the resources to act lacked the authority to act, and bodies with the authority to respond lacked the situational awareness and core competencies to capitalize on that authority. This was a perennial problem in some parts of the country where competent wildfire management demanded powers beyond what had been granted to the agencies set to the task, which is one reason why California led the way in advancing emergency management systems, long before concerns with terrorist attacks (national security prompted New York City and the federal government to follow suit).

In California, a standardized emergency management system (SEMS) was adopted after the

East Bay Hills Fire of 1991. SEMS establishes the emergency management procedures used by all state agencies in California, incorporating interagency coordination and reciprocal agreements among city and county jurisdictions. Local governments are required to be trained in SEMS and use it for emergency management if they wish to be eligible for disaster assistance and personnel funding. The system is used for five levels of emergency response: state, regional, operational area (county), local, and field levels.

SEMS calls for organizing human resources so there are no fewer than five and no more than seven workers under each supervisor. SEMS uses the Incident Command System (ICS), which was developed by the Fire Fighting Resources of California Organized for Potential Emergencies (FIRESCOPE). Under ICS, key positions are defined: the incident commander, overseeing the response to the emergency; the operation sections chief, who oversees a specific section of operations; and a public information officer, who is the designated media contact for the incident. The incident commander works with a planning section to construct an action plan that identifies the operational period and goals of the agency.

SEMS has five main components: FIRESCOPE's Incident Command System (ICS) and Multi-Agency Coordination System (MACS), the Master Mutual Aid agreement, the use of operational areas, and the Operational Area Satellite Information System (OASIS).

Incident Command System

FIRESCOPE developed the Incident Command System in the 1970s as an emergency management system for California's fire services, following a 1968 meeting of California fire chiefs. Its development came as a response to catastrophic fire damage, resulting in numerous deaths and widespread property damage, in California's urban fringe during large-scale wildfire suppression efforts. Authorities determined that the suppression efforts had been hampered not by insufficient resources but by management and communications problems.

ICS was later adopted by federal land management agencies as the standard emergency management system for all wildfire emergencies, and it became a popular model for emergency management of any sort. It was used in New York in response to the February 26, 1993, truck bombing of the World Trade Center, and in 2004 was included as a component of the Department of Homeland Security's National Incident Management System as a system to command, control, and coordinate emergency response by integrating personnel, policies, procedures, facilities, and equipment into a common organizational structure. ICS is now mandated for all emergency services that receive federal preparedness funding.

Like the rest of SEMS, ICS is scalable, providing a framework suitable for response on the local level, on the national level, or anywhere in between. In its general applications outside its origins in fire management, it is a first-on-scene incident management system, giving management authority to the first responder to an incident scene until that responder is relieved by a more qualified commander or the incident is resolved. ICS isn't a complete emergency management system—it deals with incident response and operations, not preparedness, risk mitigation, or aftermath.

Emergency management deficiencies often stem from unclear hierarchies, in which there are too many uncertainties about the chain of command and too little supervision, resulting in organizational blind spots and a general lack of accountability. A poorly defined or poorly informed planning process leads to wasted resources, and insufficient communication slows response time. When there are no predefined procedures to merge multiple agencies' efforts, cooperation becomes sloppy, determined by decisions made in haste and weakened by the cognitive biases of the on-scene responders making those decisions. The specialized jargon, procedures, and expectations of various agencies may conflict with one another and cause confusion. The strength of ICS is its emphasis on interagency cooperation to eliminate redundancy, keep agencies from tripping over each other, and reduce overhead and operating expenses; its command and control paradigm was originally based on that used by the U.S. Navy. ICS provides administrative and logistics support to emergency personnel and uses the resources from a scalable amount of inputs (agencies and other entities) in a unified effort with clearly defined roles, hierarchies, procedures, and offices of authority.

Under ICS, every individual has one and only one supervisor, and any supervisor will oversee three to seven individuals. (Under SMES, five is the minimum number.) The command structure is based on avoiding any possibility of conflicting orders or confusion over whom to report to, in order to hasten response time and minimize resource wastage. Command structure is assembled top-down on an as-needed basis; positions are not filled until they are needed. Positions can migrate to other individuals as the number of personnel involved in an incident increases, or as the situation changes—the first responder to the scene will be the initial incident commander, but command will later pass on to another responder if the incident continues. Similarly, common terminology is adopted and supersedes agency-specific terminology, though it can be difficult to ensure that this policy is implemented, especially in the heat of the moment when on-scene workers naturally revert to the jargon they're used to. Terminology for resources and positions in the hierarchy are straightforward.

ICS Management Objectives

Early in the management process, specific objectives are identified by the appropriate units, and units are then deployed to achieve those objectives, ideally in a specifically identified time frame. Strategies for achieving objectives are developed by the units best capable of doing so, not developed in a vacuum by workers unfamiliar with the terrain, in order to avoid the inefficiency of pursuing an unworkable or impractical strategy for the sake of orderliness. An incident action plan (IAP) is developed for the operational period, providing supervisors with actions to be accomplished in order to meet incident objectives. The IAP specifically identifies objectives, the individuals and units responsible for the specific actions that will achieve these objectives, communications procedures for the operational period, and the appropriate procedure to handle injuries. Hazardous materials incidents must managed with a written Incident Action Plan (IAP) prepared by the planning section; in other cases, the IAP may be written or oral.

Most incidents handled under the ICS are overseen by a single incident commander, though as noted that position may be passed from one individual to another. The incident commander is the final authority in decision making. In larger incidents, a unified command (UC), composed of two or more individuals, may govern; multiple-jurisdiction incidents are the most likely to use a unified command. The UC acts as a single entity and will usually appoint a single operations section chief who speaks on behalf of the UC as a whole in order to simplify the chain of command. Area commands are sometimes used in multiple-incident emergencies and oversee multiple incident commanders; they rarely include an operations component, and they focus on logistics and administration.

Other ICS staff positions include the public information officer, who is the designated media contact; the liaison officer, who liaises between agencies responding to the incident; the safety officer, who oversees efforts to preserve the safety of personnel; the operations section chief, who directs operations to meet incident objectives; the planning section chief, who collects the relevant information and oversees efforts to develop action plans; the logistics section chief, who oversees resources and support; and the finance and administration section chief, who tracks costs, requisitions, and other administrative data. In large incidents, there may also be a command-level information and intelligence officer. Under the Federal Emergency Management Agency (FEMA), it is common to have dual operations and logistics section chiefs, but this is considered a nonstandard application of ICS.

Among the standardized terminology established under ICS is the set of facility terminology. The incident command post (ICP) is the sole location from which the incident commander operates, but it may move during the course of the response. The staging area is the location where tactical resources await deployment, and there may be more than one. Camps provide services like food and shelter to staff, and bases are locations from which logistics and administrative functions are conducted. Helibases are secured locations where helicopters can land, refuel, and receive maintenance, whereas helispots are available only for takeoff and landing. A single location may be the ICP as well as a staging area, base, and/or camp. Large incidents may include a joint information center, where media representatives are engaged with; a joint operations center, usually predetermined; and a multiple-agency coordination center, the central command facility for overseeing strategic response to a large-scale disaster.

ICS resources are discussed in terms of "type" and "kind." "Type" is size, capacity, or other quantified information, whereas "kind" is the category of resource. For example, "100 kilowatts" is the type and "generator" the kind when speaking of a 100-kilowatt generator.

Today, ICS is used for terrorist attacks, medical emergencies, hazardous material emergencies, natural disasters and fires, vehicular and industrial accidents, hostage crises, and search and rescue operations. It is also used in nonemergency situations to manage agencies' involvement with planned events like parades, concerts, and fairs. It has been adopted by Canada, the United Kingdom, and Brazil, and New Zealand and Australia have adopted systems based on ICS. The United Nations has recommended it as the international standard for incident command and control systems.

Multiagency Coordination

Multiagency coordination is the coordination among agencies responding to an emergency, such as the police, fire department, and emergency medical technicians (EMTs) responding to a structure fire, the police agencies responding to a mass shooting, or the many agencies involved in responding to a deadly natural disaster. SEMS guidelines dictate the mechanisms of multiagency coordination at all five levels.

Multi-Agency Coordination Systems (MACS) are part of the national Incident Command System and provide the structure to prioritize incident responses, coordinate agency actions, and allocate resources to respond to large-scale emergencies. MACS are involved in providing each agency with the required situational awareness to make informed decisions, updating status reports across agency boundaries, establishing priorities among multiple incident commanders or area commands, anticipating resource requirements, resolving policy issues as needed, and coordinating strategy.

In an event in which multiple agencies are involved, a lead agency is designated for the day-to-day responsibility of administration. The lead agency typically takes the lead role in planning and developing the initial action plan, in cooperation with relevant local governments. County governments are the lead agency in operational area-level circumstances, though they have the power to designate another agency the lead agency following a joint resolution with member local governments.

The lead agency is sometimes a new or temporary agency created through a joint powers agreement (JPA) among local governments, an action authorized under California Government Code 6500 et seq. The JPA agency may also be a legal fiction representing the cooperation of multiple existing agencies, acting in concert. Under SEMS, a JPA agency may not be the lead agency at the operational area level if it is formed by more than one county. The JPA agency must be overseen by a policy-making body, as identified or established by the joint powers agreement, which consists of representatives from the signatory governments that are responsible for hiring staff, acquiring equipment and needed supplies, representing the JPA agency to other agencies, and applying for grants in the JPA agency's name. The joint powers agreement must be specific in the responsibilities and powers it assigns to the JPA agency, and it establishes specific staff positions.

Master Mutual Aid Agreement

Under California's Master Mutual Aid Agreement (MMAA), first signed in 1950, cities and counties voluntarily provide needed facilities and other resources to jurisdictions whose local resources are insufficient for a given emergency. When necessary, state agencies will also contribute. Agencies called upon by the MMAA are not limited to the fire and police departments but include medical resources and personnel, coroners' offices, search and rescue personnel, building officials, and public works staff.

Mutual aid sometimes includes providing staff members, especially support staff, to handle the increased workload in the nonoperations spheres during a response to an emergency. The governments of neighboring communities outside the area of the incident may provide some of their support staff to help fill needed staff positions or to populate the staff positions of a JPA agency.

Operational Area

Under SEMS, the operational area is the county and its political subdivisions. The county government is the lead agency in responding to emergencies at the operational area organizational level, and each California county is autonomous in determining its own organization and structure.

An operational area disaster council may be formed or designated to serve as an advisory body to the county government. In a situation where the lead agency handling the emergency is a JPA agency as discussed above, the operational area disaster council is typically the JPA policy-making agency. Such disaster councils are usually made up of elected county officials.

OASIS and NIMS

The Operational Area Satellite Information System (OASIS) is a satellite-based communications system designed to transmit data and status reports among California agencies participating in SEMS. There are 15 standardized forms used to transmit information from a satellite system in each operational area in California, each of which is linked to agencies at the local, state, and federal level.

The National Incident Management System (NIMS) is an emergency management system used by the U.S. government in conjunction with the National Response Framework to coordinate both incident management (through ICS) and preparedness among all levels of the public and private sectors. Whereas the National Response Framework, in effect since 2008, provides guiding principles for policy and coordination, and incorporates many of the principles of NIMS, NIMS provides a template much like SEMS. Adopted in 2003 by all federal agencies, NIMS is both standardized and scalable, providing operational structures applicable for any scale of incident and any number of relevant jurisdictions and agencies. Like SEMS, it is designed to be flexible and accommodate response to any kind of incident, including complex multi-incident emergencies.

ICS and MACS are the command and management component of NIMS, providing standardized terminology and organizational structure. The communications component emphasizes the use of plain language over jargon, as well as the need for interoperability, scalability, flexibility, and reliability. The preparedness component of NIMS calls for cooperation among all levels of government in order to achieve national preparedness. Preparedness is a constant, ongoing process, including planning, procurement, maintenance of resources, training exercises, and the constant evaluation of past performance and future scenarios as new information becomes available. Terrorism has especially been emphasized in the preparedness component, as a result of the role of the September 11, 2001, terrorist attacks in inspiring the creation of the Department of Homeland Security and the adoption of NIMS.

Agencies and entities involved with NIMS include law enforcement, fire departments, hazmat teams, emergency medical agencies, tow and recovery operators, highway departments, communication centers, and transportation management centers, as well as all federal departments and agencies.

National Integration Center

The Department of Homeland Security's National Integration Center (NIC) is responsible for the implementation of NIMS, including compliance specifications and ongoing administration. NIC promotes compatibility between the standards set by NIMS and those of other public- and private-sector groups, especially at the national level, and develops NIMS's national education and awareness program. It also oversees any review and revision of the NIMS system.

NIC is responsible for assessing the functionality and efficacy of NIMS's components and objectives, and it has jurisdiction over credentialing entities and personnel. It has established a database system for such credentials and works with standards development organizations to develop common national credentials.

NIC also oversees administrative matters such as establishing the naming and numbering conventions for NIMS-related publications and managing other elements of publishing such as distribution and product accessibility. It also assists agencies with NIMS training. NIC is a division of FEMA's National Preparedness Directorate.

Medical Surge Capacity Capability

The Medical Surge Capacity Capability Management System (MSCC) is the emergency management system used and developed by the Department of Health and Human Services' Public Health Emergency division, in the Office of the Assistant Secretary of Preparedness and Response. Whereas other emergency management systems are designed with a physical scene of incident in mind, MSCC is an adaptation of the Incident Command System and other NIMS elements to medical and public health crises in which either multiple incident scenes are extant, no one of which can be considered central, or in which there is no defined scene. This includes but is not limited to infectious disease outbreaks, contaminated goods or foodstuffs, chemical or biological weapons attacks, and exposure to hazardous materials.

The MSCC system was developed as part of the health care system's response to the 9/11 terrorist attacks, the 2001 anthrax attacks, and the 2005 devastation of Hurricane Katrina. It is designed as a medical emergency management system that establishes an organizational framework for meeting any major public health crisis. Unlike other applications of NIMS, there is also a strong focus on creating medical system resiliency such that health care organizations are able to recover quickly from disasters, mitigating the "secondary surge" of human costs when, as medical systems are overwhelmed by a disaster, patients in need of ongoing care suffer because of a medical attention shortage. There is a strong focus on information management, resolving interagency and policy conflicts, and medical asset support. As in other emergency response efforts, promptness is critical, and preparedness and risk mitigation shorten the time it takes to adequately respond to an incident.

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See Also: Agency Notification and Mobilization; Cabinet Office, UK; Contingency Planning; Department of Homeland Security (DHS); Early Warning Systems; Emergency Alert Systems; Emergency Management Agencies, City and County; Emergency Operations Center; Emergency Public Information; National Response Framework.

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Emergency Manager

The term *emergency manager* refers to the individual charged with creating the framework within which communities or organizations reduce vulnerability to hazards and cope with disasters. Although the position has traditionally been viewed as that of a technician specializing in disaster preparedness and response, the scope of the emergency manager has been evolving to encompass all aspects of community resilience, transforming the role of emergency manager to that of professional manager specializing in the development of emergency management programs.

Evolution

Although emergency managers are found in both the public and private sectors, the term originated with and is generally applied to public-sector employees. Although the function of government in reducing vulnerability and coping with disasters has been evolving over many years, the concept of a specific individual charged with discharging this function is of relatively recent origin and has its beginnings in the Cold War era. With the passage of the Civil Defense Act of 1950, the federal government began providing funding for local planners to develop plans for nuclear war. These planners were primarily retired military personnel who adapted military planning techniques to the various levels of government that employed them. Separate legislation (the Disaster Relief Act of 1950) provided for disaster response unrelated to civil defense and created a separate arm of the government to discharge these functions. However, these two functions were generally merged at the state and local levels. The result was a gradual shifting of the roles of the federally funded planners from nuclear war planners to all-hazards planners as the Cold War threat diminished.

Given its origins in Cold War nuclear planning, the role of the emergency manager has been closely associated with the development of the emergency operations plan and the position viewed as one of a technical specialist. The position tended to be plan-centric, with the major task of the emergency manager being to develop the emergency operations plan and prepare the jurisdiction for disaster response. However, with the adoption of the four-phase comprehensive emergency management model in 1978, there has been a growing recognition that emergency managers cannot limit their role strictly to response planning. Instead, studies have demonstrated that effective emergency managers share the same characteristics as effective managers in other fields. The increase in scope of duties necessitated by planning for mitigation and recovery in addition to preparedness, coupled with the advent of standards and program accreditation, has changed the role of the emergency manager from that of a planner to one of program manager.

This evolution from nuclear planner to all-hazards planner to program manager has been heavily influenced by a growing body of research on crisis and hazards, principally in the social sciences. Disaster research also has its origins in the Cold War: military planners were attempting to use natural disasters as a method of predicting the impacts of nuclear war on civilian populations. From this beginning, disaster research has grown to become an academic discipline in its own right and the theoretical basis for modern emergency management.

Current Role

The role of the emergency manager remains hard to define, as there is no standard job description. Until the adoption of the Principles of Emergency Management by several national emergency management organizations in 2007, there was no generally agreed-upon definition of emergency management. The actual role of an emergency manager seems to depend on two factors: (1) the size of the community and (2) the perception of competency of the emergency manager.

Where the community is relatively small, the emergency manager usually performs his or her functions as additional duties and is viewed principally as a technical expert in emergency response. The emphasis is on preparedness and response, and the majority of the effort is on developing the community's capacity to respond to crises.

Where the community is larger, the emergency manager tends to be a full-time employee, although not necessarily an emergency management professional. The role of the emergency manager tends to be broader in scope and moves toward community resiliency rather than just response. Mitigation of risk and planning for rapid recovery become part of this expanded scope.

However, even where the emergency manager is a full-time employee, the effectiveness of the position ultimately depends on the person holding the job. If the emergency manager sees his or her responsibility as encompassing all hazards and establishes his or her role in the organization as a program manager and peer, then he or she can make progress toward a goal of community resilience. However, if the emergency manager focuses solely on preparedness and response, his or her role will remain solely that of a technician with little influence on policy and strategy.

Toward Professionalism

The role of the emergency manager is in a state of flux. Although many emergency managers continue to view themselves solely as response planners, others see themselves on the verge of becoming a profession. Several factors are driving this move toward professionalism:

- The growing influence of professional associations such as the National Emergency Managers Association and the

International Association of Emergency Managers, which are seeking to establish standards and identify core competencies for emergency managers
- The development of core curricula and higher education degrees designed to prepare entry-level emergency managers
- The adoption and continued evolution of a professional certification by the International Association of Emergency Managers

Where the "traditional" emergency manager came to the position as a second career and saw the job as one limited to preparedness and response, the emergency manager of the future will most likely be someone who has chosen emergency management as a profession, has a degree in emergency management or a related field, is certified by a professional association, and sees his or her duty as one of increasing community or organizational resilience.

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See Also: Crisis Management, Emerging Trends in; Emergency Management, Principles of.

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Emergency Medical Care

Emergency medical care is typically defined as medical services provided by pre-hospital care providers such as first responders, emergency medical technicians, and paramedics. Most people identify emergency medical services as the ambulance service; however, emergency medical care may also be provided by the fire department or law enforcement until an ambulance arrives.

Service Levels

Emergency medical care is provided at three levels. These include the basic level, advanced level, and critical care level. Basic emergency medical care is provided by emergency medical technicians (EMTs). This care may include assisting with emergency childbirth, splinting fractures, using bandages and dressings to stop bleeding, assisting with some medications, and securing patients involved in motor vehicle accidents. Basic emergency medical technicians may also use specialized tools, such as the Jaws of Life, to remove accident victims involved in accidents. Basic EMTs may also perform cardiopulmonary resuscitation (CPR) and the Heimlich maneuver to assisting choking victims.

Advanced emergency medical technicians (AEMT) and paramedics (formerly known as EMT-P, now just paramedic) provide advanced-level emergency medical care, including administering medications, intubation, and using electrocardiograms and interpretation of the information. Advanced EMTs are not licensed to perform the same level of advanced services as paramedics and are limited in their scope of practice. For instance, AEMTs can only assist with a limited amount of medications administered intravenously, such as glucose (similar to sugar water) and Lactated Ringer's (used to clot the blood). Comparably, paramedics are allowed to provide medications that AEMTs are not allowed to provide.

Paramedics may use a host of medications to assist the sick and injured, such as controlled substances for pain (e.g., morphine) or epinephrine for persons experiencing a heart attack or allergic reaction. Paramedics may insert breathing tubes into the airway to assist with breathing, use intravenous fluids, and use advanced electrocardiogram equipment that basic and advanced emergency medical technicians are not allowed to use. Paramedics typically perform their tasks under the authority of a physician medical director.

Emergency medical services (EMS) are required by state and federal laws to operate using various medical algorithms or preset directions. These algorithms allow EMS crews to provide patient care without a physician actually being on board the ambulance or next to the pre-hospital care provider. However, most EMS crews are required to contact a physician via radio or phone while providing care or soon after.

EMS agencies and private companies may employ basic EMTs, advanced EMTs, paramedics, or a combination of all three. Many communities provide tiered emergency medical services whereby all emergency calls are coded, or divided into the type of emergency. For instance, a person with a fractured arm may receive an ambulance staffed with basic EMTs, but a female giving birth may receive an ambulance staffed by advanced EMTs. However, a person experiencing a heart attack or life-threatening emergency will typically have an ambulance dispatched that is staffed only by paramedics. In tiered emergency medical service systems, the closest ambulance is dispatched first so that the patient receives some care until a paramedic ambulance can arrive. Ambulances staffed by basic or advanced EMTs may provide initial transportation and meet a paramedic ambulance en route to the hospital. This method of treatment and transportation ensures that the patient receives both immediate care and advanced care within a matter of minutes.

History

Emergency medical care can trace its roots all the way back to 1500 B.C.E., when local citizens were documented assisting travelers in need of medical attention. These local citizens would receive notification of injured travelers and respond by cleaning and bandaging their wounds, splinting fractures, and assisting them with temporary shelter until their wounds healed. Later, the Roman Empire used chariots and physicians to retrieve injured soldiers and provide care for them. However, French ruler Napoleon is credited with creating the first system of field care to include triage, treatment, and transportation all in one. Moreover, Napoleon's army also had standing protocols so that all physicians, nurses, and field providers offered the same emergency medical care no matter which part of the world they were in. Emergency medical care continued to develop as the United States entered the Civil War and both Union and Confederate armies created field battle aid stations where soldiers and sailors could be transported for emergency care. Other countries, such as the United Kingdom, Belgium, and Germany, continued to develop their own emergency medical services during this time as well. Private and municipal ambulance services begin to operate in major cities throughout the world in 1865 in cities such as Cincinnati, New York, and London.

The first documented introduction of cardiopulmonary resuscitation (CPR) can be traced to 1960. It was during this time that mobile intensive care units were introduced in Belfast, Ireland; Los Angeles, California; and Columbus, Ohio. Soon after, these same cities began to train emergency medical technicians and paramedics to provide care in the field under the direction of physicians. However, major conflicts such as the war in Vietnam led to new methods of providing field triage and care for soldiers that were quickly picked up by fire departments and ambulance services throughout the world.

The U.S. Department of Transportation's National Highway Traffic Safety Administration (DOT NHTSA) became responsible for all emergency medical services (EMS) training and oversight after the passage of the Highway Safety Act of 1966. This act gave the department authority over EMS because the majority of EMS calls received were secondary to motor vehicle collisions (MVCs) along the nation's highways and interstates. The act created a core training curriculum for emergency medical technicians, including response to these MVCs. The curriculum has been updated several times since 1966, with the most recent changes occurring in 1984 and again in the late 1990s. Aside from the National Highway Traffic Safety Administration, the National Association of Emergency Medical Technicians (NAEMT) has been instrumental in encouraging change within emergency medical services. Moreover, the NAEMT sponsors the National Registry of Emergency Medical Technicians (NREMT), which is the highest level of national EMT and paramedic certification available in the United States, Canada, and other developed nations.

Current Efforts

Major scientific advancements have continued to change the face of emergency medical care. These innovations include the use of advanced

Michelle Hollingsworth, a registered nurse, listens for breathing following simulated lifesaving measures during a hospital emergency response training (HERT) for mass casualty incidents course, Anniston, Alabama, January 21, 2011. HERT places emergency response providers in a realistic mass-casualty training scenario. Often, government grants assist public and private emergency medical care agencies with equipment updates and training, which has been especially critical since 9/11.

airway adjuncts, better medications, and highly advanced equipment such as the 12-lead electrocardiogram monitor and the pulse oximeter. In addition, ambulances are now equipped with advanced radio communication systems, computers, and other patient-care equipment. Emergency medical technicians and paramedics are now allowed to use advanced medications and protocols to provide better care for their patients. This includes new drugs to treat heart attacks (myocardial infarctions), drug overdoses, and strokes (cerebral vascular accidents). Paramedics are also allowed to treat patients for pain such as would occur secondary to a motor vehicle accident (MVA). In many states, EMTs and paramedics are allowed to staff hospital emergency departments, clinics, and outpatient surgery centers. Several larger states have recently moved from certification for EMTs and paramedics to licensure. This ensures that pre-hospital care providers receive a higher level of education than was previously required. Another aspect of emergency medical care is the emergency medical dispatcher (EMD). These professionals are trained to receive emergency calls, dispatch help, and provide emergency instructions to the person calling for help.

Future Efforts

Changes in emergency medical care include further integration of ambulance- and fire-based EMS into the public health community. These efforts include assisting with identification and modification of illnesses and management of those illnesses along with physicians, nurses, and other allied health professionals. Additional efforts include better integration with public safety agencies such as fire, police, emergency management, and homeland security, especially with regard to communications, research, and prevention. Conversely, public education, clinical care, physician medical direction, and improvement in training systems are being explored for the future. EMS agencies are also researching future improvements in patient care technology by beta testing new Web-based treatment between the ambulance and the physician at the hospital. This technology allows the physician to work with the paramedic to assess the patient via live video camera and then direct patient care before the ambulance arrives at the hospital. Similar systems are currently being explored for paramedics working on offshore drilling rigs and in remote villages.

One major concern for future efforts is the continued lack of funding for emergency medical care. Because many of the agencies providing emergency medical care are either volunteer service, fire-based response, or ambulances, or they are municipal-owned/third-service systems, a further reduction in budgets threatens to reduce these future efforts. Some communities have eliminated municipally owned emergency medical care agencies and instead have contracted with private companies to provide their emergency medical care and ambulance transportation needs. Although this move may save communities money in the short term, it may do little to support future efforts to provide first-class emergency medical care. Because these private emergency medical care companies are fee based, they may face similar budgetary constraints because they are not supported with public tax subsidies; they are paid only if they transport patients. These private companies are in business to make money and, like other businesses, they require payment for services rendered within a few days of the ambulance transport. This is a major concern in smaller communities that require an ambulance for emergencies but receive only a handful of emergency calls per month.

Private emergency medical care companies must find other ways to remain in business, including providing nonemergency transportation to and from long-term care facilities that often offer higher reimbursement for service than emergency medical calls provide. These concerns must be addressed by government agencies, communities, and nongovernmental groups before EMS can advance into the future. This may be difficult to do with private companies unless the company is well positioned to invest additional capital into these future advancements. Fortunately, local, state, and federal grants are often available to assist public and private emergency medical care agencies with updating both equipment and training for future advancements. This is especially the case since the terrorist attacks of 9/11, when so many emergency medical care agencies responded to provide assistance to the sick and injured.

Although many communities contract with private companies, they often remain involved in major operational decisions and medical oversight. Communities will often form emergency medical care committees and may involve local physicians, the fire chief, the mayor, or other community leaders. These committees ensure that the best emergency medical care remains available no matter if it is a public or private organization providing this care. Private companies are also providing fire service in many communities. These companies are often responsible for medical first response and may be dispatched to medical calls along with an ambulance. Because fire departments are often geographically located throughout communities, they are typically much closer to calls for help. A fire apparatus with personnel trained in emergency medical care will respond and provide care until an ambulance arrives. These crews are often staffed with emergency medical technicians, advanced emergency medical technicians, and paramedics. In some communities, all of the emergency medical care is provided by the local fire department, including all ambulance transportation.

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See Also: Crisis, Definition of; Crisis Communication; Documentation; Emergency, Definition of; Emergency Medical Care; Emergency Responders; Evacuation; Exercises; Health and Medical Response Scenarios; Mutual Aid and Assistance; Preparedness; Response; Search and Rescue; Training; Uncertainty.

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Emergency Medicine

The first organized efforts to perform emergency medicine were undertaken during the French Revolution, thanks to the contributions of a French surgeon, Dominique Jean Larrey. In the wake of the Napoleonic armies, he conceived the idea of an ambulance, or, as it was called at that time, *voiture d'ambulance volante,* for the fast transport of wounded soldiers at the camp infirmary. He is therefore regarded as the father of emergency medicine.

Emergency medicine has historically experienced strong development in connection with large wars and with the application and development of military medicine. Over the past 20 years, emergency medicine has seen enormous growth, developing and requiring more skills over time. For example, an essential part of training and knowledge in this branch of medicine includes advanced trauma life support (ATLS), advanced life support (ALS), and advanced cardiac life support (ACLS). In addition, there has been a great development in technology, especially with the advent of the emergency room (ER), the first point of access to hospitals for patients in serious condition.

The notion of emergency medicine does not apply exclusively to the routine of everyday life (such as traffic accidents, domestic accidents, poisoning, burns, cardiac arrests, and other ailments), but also to situations that go far beyond the capacity for a system to respond, as in disasters, catastrophes, and crisis situations.

Responding to an emergency does not only involve rescuing the wounded or recovering the bodies (though such actions are certainly crucial in the early hours), but also includes addressing the many highly demanding organizational, social, psychological, economic, and moral problems that could affect both the population and health services.

Emergency Medicine Tools

Emergency medicine involves the combination of various disciplines aimed at achieving common goals, such as limiting the loss of life and restoring acceptable living conditions. The environment in which emergency medical operations are carried out requires a capacity for adaptation, which is typical of the field of medicine. Medical providers must be able to identify the priorities that characterize emergency medicine, take charge of a large number of victims, and consider each victim as an individual.

To achieve this and minimize improvisation, advance planning for an emergency should be based on a typically applied field of medical doctrine that maintains a hierarchy of tasks and an essential characteristic of the medical treatment of war. Every scientific discipline uses operational tools, and there are three tools that characterize emergency medicine: strategy, logistics, and tactics.

With the evolution of medicine and technology, an emergency is less defined as an uncontrolled event, for which a branch of medicine, studying global health interventions, has developed over time. Instead, emergency medicine can be considered a compilation of many types of medicine traditionally applied to a collective crisis or disaster.

Strategy, Logistics, and Tactics

Strategy is the art of designing emergency plans and consists of the following three key features:

- *Top management:* Emergency plans should be designed by experts with extensive experience.
- *Planning:* Designing a plan should consist of the analysis of a wide range of possible risks, and it should be noted that the implementation of a response must be based on the prediction of events related to the consequences thereof.
- *Training:* Operator training is a prerequisite.

Logistics is what allows the system to survive and function. It is literally defined as the art of providing and allowing a fair and rational deployment in the field of people, materials, and resources. It is necessary to establish some a priori criteria, such as the following:

- *Type of event:* For example, the collapse of a housing structure in an urban area will result in a type of response different from a train derailment, a blackout, or a pandemic.
- *Operating environment:* Environmental conditions strongly affect the system response, including such factors as the action taking place on uneven terrain, the presence of possible additional risks, difficulties in access to victims, climatic conditions, and the ability to channel resources effectively. All of these conditions must be considered binding management intervention.
- *Duration of the operations:* The autonomy of the rescuers and/or their rotation is an important variable for logistical purposes.

Tactics is the application of emergency plans by consequential operating procedures aimed at establishing the chain of rescue. This sequence is applicable in any event regardless of the type of crisis. The crisis management chain must meet the following requirements:

- The centrality of a single institution that receives the alarm, an assessment of the event size, and a prompt, coordinated response.
- Medicalization is at the core of emergency medicine. Even though the problems encountered in ordinary emergencies could become amplified, the most common error is to respond to an emergency by inordinately increasing the deployment of personnel and resources. Instead, the right approach is to establish priorities for evacuation to definitive care sites for victims.

Principles of Planning

Crisis situations are best managed under standard operating procedures (SOPs), and such procedures must be highlighted during the planning phase. Planning is a key step to having a good response strategy. It is a critical phase, and it is effective only when responders understand and can implement those plans.

It has been argued that it is necessary for planning to involve teamwork, in which all leaders and supervisors of the various structures or offices can work collaboratively to design a response plan.

Often, planning takes into account a broad range of scenarios, like a barricaded gunman, a hazardous material spill, a long-term blackout, a terrorist attack, or a pandemic disease. A plan should have an “all-hazard approach,” which could be applied to any critical incident regardless of its specific nature. It should meet the following criteria:

- The plan must be simple.
- All responders must understand the plan.
- All responders must practice the plan through training.
- The plan must be compliant with the National Institute Management System (NIMS).

Development of the plan begins with an assessment of vulnerability. The results of this assessment will show (1) how likely a situation is to occur, (2) what means are available to stop or prevent the situation, and (3) what is necessary for a given situation.

Developing the plan has other advantages. Unrecognized hazardous conditions that would aggravate a crisis situation may be discovered, and planners can work to avoid or totally eliminate them. The planning process may bring to light deficiencies, such as the lack of resources (equipment, trained personnel, supplies) or items that can be rectified before an emergency occurs. In addition, a plan should promote safety awareness and show the organization’s commitment to the safety of its workers.

Planners should take into account three areas of hazards: natural, technological, and human-made. Each of these presents specific risks that can be brought to a crisis situation such as an explosion, building collapse, major structural failure, spill of flammable liquids, terrorist activities, loss of electrical power, loss of water supply, and loss of communications.

Completing a comprehensive plan for handling crises is a major step toward preventing disasters. However, it is difficult to predict all of the problems that may happen unless the plan is tested.

Hospital Planning

Hospitals and health care facilities handle difficult situations every day. However, few of these situations usually send a hospital system into crisis, because there are more than enough resources to cope. Why, then, is it necessary to have specific planning for hospitals during a crisis situation? It is because a crisis situation might crash the entire apparatus of emergency room departments, aggravate the health status of patients, interrupt the flow of medical gases, result in the sudden interruption of electrical current, interrupt the communication systems, stop the flow of information, and significantly worsen the economic balance of a hospital.

Crisis situations are not all alike, and specific plans and procedures should be drawn up to cope with the various types of events that can lead to such situations.

This work must be carried out by a team composed not only of medical personnel but also of administrative personnel. The resource management procedures and diagnostic-therapeutic treatments must be provided after careful consideration of the following parameters: the expected type of event, type of risk, estimated number of injuries and diseases prevailing in each event, the location and extent of the affected area, infrastructure efficiency, and stockpile assessment of medicines and nonmedical supplies. During the planning period, as well as the later response phase, the crisis unit should be the executive core for providing both health care and administration.

Training

A plan cannot properly work without it first being tested. The training phase is perhaps the most important phase to verify if all the personnel (both medical and nonmedical) have fully understood the operating procedures of the plan, and if each component of the system fully understands its role.

Many universities are introducing specific degree programs concerning emergency medicine, specifically oriented to crisis and disaster management. The core content of these programs provides a list of all the topics, principles, and technical skills that students need to learn in order to perform certain jobs or duties. These skills and knowledge are gained by studying the definitions of a crisis or disaster and all its related features and the phases of a crisis response, and focusing on medical care and nonmedical care, including emergency medical care, with particular reference to trauma management. Other concerns during an emergency medical crisis include mental health, toxic-chemical injuries, mass burn care, pediatric casualties, and pharmaceutical distribution.

Beyond academic programs that provide the necessary base of knowledge, it is extremely important to offer continuous training for emergency medical personnel. Fundamental tools in this phase are tabletop exercises and drills.

In its official documents, the Federal Emergency Management Agency (FEMA) has outlined the guidelines for designing a tabletop exercise to simulate a crisis situation in an informal and stress-free environment. The participants are usually people on a decision-making level who gather around a table to discuss general problems and procedures in the context of a crisis or emergency scenario. The focus is on training and familiarization with roles, procedures, duties, and responsibilities.

Another interesting method is the Emergo Train System (ETS), which was designed at the Center for Research and Training in Disaster Medicine and Traumatology at the Kathmandu Medical College exchange program at Linkoping University in Sweden. In ETS, participants in real-scale simulations of emergency scenarios act exactly as they would in an actual crisis, with the only difference being that gestures on the field, operations, and interactions are represented on boards with the help of magnetic icons.

This greatly reduces the cost of the simulation, while still providing an overview of the general situation (especially during the moments of timeout and the final debriefing) as well as compressing the time intervals according to the time scale participants choose to use.

The simulation still has all the characteristics of a real-scale situation, including the emotional involvement of participants. The level of technical expertise required to interpret the various roles expected from the simulation can be modulated as a function of the specific objectives that are identified for the single scenario.

In contrast, training drills have a very different appearance, feature, and dimension, which, besides being designed based on specific scenarios, involve all staff and population. The drill's purpose is to test the response plan for specific situations. Topics increasingly relevant in these simulations are the possible massive influx of wounded, a possible blackout in a hospital, an uncontrolled pandemic disease, or a contamination by chemical, biological, radiological, nuclear, and enhanced conventional weapons (CBRNE) agents.

A crisis cannot be managed without a clear understanding of the operating procedures. In the early moments, two main factors have to be faced: uncontrolled panic and confusion. The purpose of the drills is to implement procedures to stabilize the scene, limit the acceleration of the growth of incident size, and ensure personnel's and civilians' safety; limit worsening of the already precarious health situations; ensure that all the procedures for scene management will be put into place through a rapid assessment; and subsequently establish the Incident Command System.

Response: ICS and HEICS

In the response phase, there are some goals that need to be reached after a crisis occurs. The first goal is to limit the growth of the incident and ensure the safety of both civilians and responders, and then stabilize the scene. Command must be assumed by an Incident Commander, and an Incident Command System (ICS) must be deployed.

ICS was created in 1980 and was originally developed in California under the FIRESCOPE program. ICS resulted from the obvious need for a new approach to the problem of managing rapidly moving wildfires in the early 1970s.

An ICS will provide for three types of operations: single-jurisdiction or single-agency involvement, single-jurisdiction or multiagency involvement, and multijurisdiction or multiagency involvement. The ICS must be able to adapt its structure to any emergency or incident and is a modular organization based upon the type and size of an incident.

Over time, specific ICSs have been developed. One of these is the hospital emegency incident command system (HEICS), which is designed to meet the needs of an internal response to the hospital (such as the medical care of mass gatherings, or sudden incidents inside the building, such as a blackout or system failures that could bring an interruption of medical gas erogation).

Based upon public safety's Incident Command System, HEICS has already proved valuable in helping hospitals serve the community during a crisis and resume normal operations as soon as possible. It has also assisted in the operation of a medical facility in a time of crisis.

In its August 1997 Healthcare Facilities Management Series, the American Society for Healthcare Engineering of the American Hospital Association stated that one of the best examples of emergency preparedness through checklists can be found in the HEICS.

The HEICS is primarily based on three factors: flexibility, minimal staffing (adding or removing positions), and cost-effectiveness (financial resources are saved by activating only those positions that are necessary).

In the response phase, emergency medical services (EMS) provide a significant contribution. EMS is a type of emergency service dedicated to providing out-of-hospital basic and acute medical care, transport to definitive care, and medical transport to patients with illnesses and injuries that prevent the patients from transporting themselves.

EMS personnel, whether they are emergency physicsian, paramedics, or emergency medical technicians, are also part of HEICS, and together with hospital personnel they help in incident and crisis management.

Triage and Medical Care Protocols

Beyond mere management, specific health protocols (triage and medical management protocols) often must be put in place for the recognition and management of critically ill patients. Triage is the process of determining the priority of patients' treatments based on the severity of their condition. The term comes from the French verb *trier*, meaning to separate or select. Originally created by a French doctor during World War I, it has been improved over the years and now is the most commonly used system to give priority of care to patients.

The most-used triage system in the United States is simple triage and rapid treatment (START). It was developed at Hoag Hospital in Newport Beach, California, for use by emergency services. It has been field-proven in mass casualty incidents such as train wrecks and bus accidents, though it was developed for use by firefighters after earthquakes.

There are four priority levels in which patients can be grouped: green, in which the casualty is classified noncritical and can wait for treatment; yellow, in which the casualty requires medical attention within six hours, or injuries are potentially life-threatening but can wait until the red casualties are stabilized and evacuated; red, in which the casualty requires immediate medical attention and will not survive if not seen soon; and black, which identifies all the casualties whose injuries are so severe that they have a minimal chance of survival.

Within the hospital system, the first stage on arrival at the emergency room is assessment by the hospital triage nurse, who will evaluate the patient's condition and designate his or her priority code so he or she can have access to the emergency room and obtain the appropriate treatment.

After triage procedures, emergency physicians, critical care nurses, and paramedics must follow specific protocols for medical care and major trauma management. These protocols are mainly based on a first rapid assessment and fast diagnosis, followed by stabilizing multiple injuries; mass burn care; rapid airway access; advanced cardiac life support; drug infusion; and medical care of biological, chemical, and radiation incidents. Besides these protocols that are specific for major trauma, medical teams usually have to perform certain tasks to avoid pandemic disease and its spread into the health care facility. This happened in 2003 in Toronto, when a young man presented at the emergency room with a "community-acquired pneumonia." He spent the night in the emergency room waiting for a bed. While he was waiting, he infected two patients and several staff members with severe acute respiratory syndrome (SARS). As result of this exposure, three people died and 31 became ill.

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See Also: Biological Weapons; Catastrophe, Definition of; Centers for Disease Control and Prevention (CDC); Chemical Weapons; Coordination; Crisis Communications; Crisis Simulations; Disaster, Definition of; Disaster Assessment; Disaster Drills; Emergency Management, Principles of; Emergency Medical Care; Emergency Responders; Evacuation; Exercises; Health and Medical Response Scenarios; Incident Action Plans; Incident Management; Incident Response; Infectious Disease; Logistics; Mass Care; Mental Illness; National Incident Management System (NIMS); Nuclear and Radiological Weapons; Pandemics; Scenario Planning; Simulations; Surge Capacity, Hospitals; Trauma.

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Emergency Operations Center

The emergency operations center (EOC) is a predesignated facility established by an agency or jurisdiction to coordinate the overall agency or jurisdictional response and support to an emergency. Although the physical facilities and operating structure may vary, all emergency operations centers share the common functions of situation assessment, strategy development, and resource allocation.

Core Capabilities

Although facility design and operational structure vary widely in emergency operations centers, there are several core capabilities that must be present for successful operations. The principal function of the emergency operations center is to develop a coordinated strategy for responding to an emergency. Successful accomplishment of this function requires that the emergency operations center staff be able to gather and assess situational information on which decision makers can base policies and strategies. Once the strategy is developed, the emergency operations center must have the capacity to implement that strategy through the allocation of resources, either as services or as tangible goods. These three critical functions place a premium on communications both internal and external to the emergency operations center.

Design

The design of an emergency operations center is determined by a number of factors. The ideal is a dedicated facility that provides sufficient operating space and environmental protection for the staff and has sufficient capabilities to support primary functions. For many jurisdictions, however, the emergency operations center is a dual-use facility that serves other daily functions such as meeting or office space and is configured at the time of activation. There are additional design concepts such as a virtual emergency operations center where participants are connected via teleconference, videoconference, and/or Internet connectivity, but these do not tend to be common. A number of agencies make use of mobile command vehicles that serve as emergency operations centers, although they are most commonly used as incident command posts at the scene of an emergency. The dedicated facility and multiuse facility remain the most common designs for emergency operations centers. No matter which design concept is used, there are several critical considerations in designing an emergency operations center.

The anticipated risks faced by the community determine the tasks that the emergency operations center must be prepared to perform. This needs assessment based on risk determines operating concepts, potential locations for the facility, staffing requirements, and so forth.

The location of the emergency operations center will have a bearing on the survivability of the facility and the speed with which it can be activated. A remote location requires additional staff travel time, which may be affected by damage to the road network. Locating the facility within a hazard zone means that it could potentially be unavailable when most needed.

Although there are core missions and functions for any emergency operations center, the operating structure used by the jurisdiction will determine which capabilities must be present, the number of staff, size of facility, and other factors.

Emergency operations centers are expected to have redundancy built in and be able function during any foreseeable emergency. Consequently, critical systems should operate in parallel so that the failure of one system does not compromise the facility's ability to perform its mission. The most critical systems usually involve communications and power, so emergency operations centers are normally equipped with alternative power sources and multiple communications systems.

Emergency operations centers need flexibility. Designs are based on best estimates of need at the time of construction. However, the advent of new technologies, the addition of new stakeholders, and changing operational requirements will require future changes to and reconfiguration of the facility. The emergency operations center design should contain sufficient flexibility to adapt to future changes.

Management

For the emergency operations center to function properly during an emergency. there is a considerable amount of preparation that must take place in terms of both preparing the physical facility and developing the policies and procedures to support operations and return the facility to a state of readiness. Note that these tasks are related to but not synonymous with the tactical activities performed by the staff. Where the tactical activities focus on response to the emergency, management

Case Study: Emergency Operations Center in the World Trade Center

In 2001, the city of New York had one of the most sophisticated emergency operations centers in the country. The facility was located on the 23rd floor of 7 World Trade Center (7WTC), one of the buildings in the World Trade Center complex. The facility had steel framing and Kevlar-reinforced walls designed to withstand 200 mph winds. It was located within walking distance of City Hall and key agency headquarters, such as the police and fire departments. 7WTC also housed the offices of key federal agencies such as the Central Intelligence Agency and the Secret Service and was considered one of the most secure buildings in New York. The facility housed computer-equipped workstations for up to 68 agencies, with an expansion capacity of another 40 stations. The workstations were arranged in a series of functional “pods” (e.g., health and medical or public safety), and each station was equipped with software unique to the user agency, allowing each access to its specialized functions. A briefing area for key executives overlooked the work area, providing a dramatic backdrop for media releases. The facility included a range of communications and video display systems.

On the morning of September 11, the Office of Emergency Management was forced to order the evacuation of the emergency operations center shortly after the second aircraft struck the Twin Towers. Because of the immediacy of the evacuation, only limited equipment and documentation were removed. 7WTC was severely damaged when the second tower collapsed later that afternoon, shortly after 4 P.M.

The emergency operations center moved to several temporary sites and was eventually relocated to the Police Academy, a site with limited space and communications. On the evening of September 13, the emergency operations center was relocated to a large warehouse space on the Hudson River.

Although the physical facility that housed the emergency operations center had been destroyed, along with all the documentation to support operations, the staff from the facility were intact and available to reconstitute the emergency operations center in the new location. Significantly, the staff chose to replicate the lost facility rather than to develop a new design on the fly. Consequently, the facility was designed using the pod concept and the executive briefing area that were familiar to the staff. The city arranged for rapid delivery of computers and network support and had an operational system within 36 hours. The emergency operations center continued to evolve over time, expanding to accommodate additional support agencies. Additional staff were provided through mutual aid and by Red Cross volunteers. For example, a detective from Nassau County, provided under a mutual aid agreement, was responsible for developing and implementing a logistics section. Federal agencies also opted to locate their operations at the new emergency operations center.

Coordinating the activities of so many participating agencies posed a significant problem. The emergency operations center staff once more made use of capabilities that had been put in place during the design of the original emergency operations center. The original center made use of an emergency management software program to provide situational awareness, coordinate activities, and manage resources. This software program was housed on the vendor’s server and was still available for use. It initially functioned as a virtual emergency operations center until the new site became operational and was eventually expanded to accommodate some 1,700 users representing over 150 agencies. Twelve wireless command post laptops were used to link the emergency operations center with field operations at Ground Zero and resource staging areas.

The reconstitution of the emergency operations center in New York following its destruction succeeded for a number of reasons. The first was the rapid evacuation of the staff, which not only saved many lives but also left the team intact to provide both continuity and institutional memory to the response operation. Second, New York was able to draw on a considerable amount of resources through its own large agencies, mutual aid resources, and private-sector companies and volunteers. This abundance of resources compensated for the lack of an alternate emergency operations center. Finally,

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the decision to use the design of the destroyed facility for the initial layout of the facility meant that staff were working in an environment they understood and with which they were comfortable. The decision to house the emergency operations center at 7WTC, a facility in close proximity to where a terrorist bomb had exploded in 1993, would come under considerable criticism after September 11. However, the city had considered 55 other sites before making a final decision and felt that the secure nature of the building and the close proximity to key agencies outweighed the risk.

of the emergency operations is concerned with creating an operating environment in the facility that allows staff to conduct tactical activities with minimal stress and disruption.

Emergency operations center management falls into two broad categories: operations management and facility management. Operations management refers to the development of the procedures and documentation for use of the facility and supporting tactical activities. These include standard operating procedures for tasks such as activation and stand-down, administrative functions such as the process for ordering supplies, and checklists for use of equipment. Operations management also includes training and exercises to prepare staff to function within the emergency operations center.

The emergency operations center requires the same support as would any office building. The physical plant needs to be maintained, services such as security or janitorial provided, and supplies stocked. Activation may also require that routine services be increased or decreased and additional resources provided. This is the role of facility management and may be a more complex task than that of operations management as it involves multiple disciplines. In addition to the basic maintenance of the physical plant, it may also involve contracting, logistics, security, communications, information technology, catering, and so forth.

Operational Concepts

Response activity within the emergency operations center generally operates under one of two basic concepts. The general concept promulgated by the Department of Homeland Security is that of the emergency operations center as a multiagency coordination center. Under this concept, stakeholder representatives coordinate response activities and develop strategies that are implemented through normal agency chains of command. Senior agency officials provide oversight to this process as part of an interagency policy group. The emergency operations center does not direct field activity. This type of emergency operations center tends to be found at the federal and state levels and in large jurisdictions.

The second concept is that of the emergency operations center as command post. Under this concept, senior agency officials are present in the emergency operations center and directly in charge of the response. The emergency operations center in essence functions as an area command and directs the field response. This concept is generally employed by smaller jurisdictions that may lack the resources to staff both a command post and a separate emergency operations center.

Operational concept drives the operational structure, which, in turn, determines the configuration and layout of the emergency operations center. Operational structure generally tends to be functionally based, with staff organized either by branches and units under the incident command system or by emergency support functions where a primary agency coordinates the activity of multiple supporting agencies. In addition, most emergency operations centers place these functional groupings under the five basic functional categories specified by the incident command system: management, planning, operations, logistics, and finance/administration. These functional groupings determine the physical layout of the emergency operations center.

A common mistake is the assumption that the emergency operations center is for use only under the extreme conditions of a disaster. This attitude almost always results in the emergency operations center being activated too late in a crisis and the staff having little or no operational experience. Effective emergency operations centers are scalable and capable of providing support at multiple levels of crisis. For example, during an anticipated crisis or slow-onset event such as a flood, the emergency operations center may be activated with a small team solely for the purpose of gathering information on the potential event. Most emergency operations plans provide for a partial activation (i.e., limited staff) of the emergency operations center to support less-than-extreme events that do not rise to the level of disaster or to coordinate large civic events.

Leveraging the scalability of the emergency operations center allows for the following several benefits that increase organizational resilience:

- Provides staff experience with emergency operations center procedures and equipment
- Helps identify shortfalls in resources and capabilities
- Positions the organization to react quickly to an unexpected escalation of a crisis
- Imparts a positive public image of preparedness on the part of the emergency management organization

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See Also: Coordination; Emergency Support Functions; National Incident Management System (NIMS); National Response Framework; Operational Plans.

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Emergency Public Information

During a period of emergency, information must be disseminated to the public, both by broadcast when possible and in response to specific inquiries. Emergency management personnel have discovered on many occasions the verbosity of members of the public during a crisis, and inquiries are limited not simply to people trying to get information they need (about hazards, emergency procedures, closures, the fate of loved ones) but include people offering help, donations, advice, complaints, and commentary. In many circumstances there is a tug of war to be adjudicated by whoever is managing the emergency: on one hand, the public is best served and best satisfied by information delivered in a timely fashion; on the other hand, the very nature of an emergency means that specifics of the situation could change rapidly, and information provided too quickly could be information that proves to be incorrect. Regardless of the reason for the error, the organization releasing the incorrect information will often be held accountable for it by the public. Information is ideally concise, so that it is easily understood, remembered, and repeated to others; it should also be clear and specific, containing exact directions for procedures the public should follow, if applicable, or precise cautions for how to avoid being impacted by the emergency.

Emergency Warning Systems

Information includes warning. Emergency warning systems exist in the United States for earthquakes, volcanoes, tsunamis, landslides, hurricanes, tornadoes, floods, avalanches, nuclear power plant disasters, hazardous materials storage site or transportation disasters, dam failures, nuclear attacks, and terrorist attacks, and the Emergency Broadcast System is available to communicate emergency warnings and other emergency information by radio and television. There is a great deal of decision making involved in emergency warnings: knowing whether an emerging situation merits a warning or not, whom to warn (the affected area is not always immediately clear, and warning too broad an area or the wrong area can clog the roadways during an attempted evacuation), and when to warn them. Likewise, the severity of the emergency dictates, generally, the manner of warning. Severe thunderstorm warnings will reach only those who happen to be watching television or listening to the radio at the time, unless they check the weather online or own a weather radio (a tone-alert radio that sounds an alert when a warning is issued). But the consequences of being unaware of a severe thunderstorm are mild enough to deem this acceptable. A nuclear power plant disaster, on the other hand, or a toxic waste spill may require the deployment of emergency personnel to deliver the warning street to street, door to door. Automated dialing of telephones to deliver a recorded message is also a possibility in many districts, though the diminished popularity of landlines as cell phones are adopted may mean this method reaches a smaller audience than it used to. Some emergencies are so local that broadcasting a warning is counterproductive: it is common practice for emergency personnel to notify neighbors of a home fire, or to ask bystanders to do so, in case anyone is home who could be placed in jeopardy if the fire spreads (or by smoke inhalation), or anyone elderly or disabled who needs assistance. Although the nature of the emergency in this case is severe, the number of people requiring the information is small enough and specific enough that use of a broader public outreach would not be effective. As with other emergency information, it is highly important that emergency warnings be clear, accurate, and specific, for the benefit both of those affected and those unaffected (and for the sake of making a clear delineation between the two, to minimize panic). Ambiguous and emotionally charged language should both be avoided.

In a Guaynabo, Puerto Rico, radio station, Justo Hernandez participates in a public service announcement (PSA) program that airs on several radio stations in Puerto Rico, September 15, 2011. PSAs are most often associated with radio and television.

Warning Decision Making and Delegation

Decisions about issuing warnings—and about all information dissemination approaches—should be informed by previous emergencies and the public response, in order to best prepare personnel for dealing with the public during the crisis. If the present emergency closely resembles a recent emergency in the same area or nearby, relevant differences between the two should be highlighted: it is important for the public to understand the need for a differently calibrated response to a well-organized strong hurricane after a damp disappointment of a tropical storm, but also important that they understand the difference between an airport closure while the bomb squad investigates an unidentified package and a known terrorist incident. The response to an emergency warning is a complicated process with both social and psychological factors; one person's response can alter, lead, or dampen another's, and people may respond differently depending on how they hear about it. One rule of thumb that seems to hold true is that the more specific a warning is, the more the audience will take it to heart: a warning issued to the Gulf Coast, to Louisiana, and to the French Quarter will be received with three different degrees of belief.

Of course, ultimately the most effective warning is the one delivered to a well-informed public.

Public outreach programs help prep the public to better receive emergency information by familiarizing them with emergency situations, whether endemic to the area (wildfires, blizzards, hurricanes) or plausible anywhere (terrorist attacks, hazardous material spills, prolonged power outages, heat waves, epidemics). A well-informed public can prevent emergency situations through their behavior in some cases, by adopting proper practices to avoid an influenza epidemic, for instance, and to reduce the risk of fires or the impact of droughts. This type of information encompasses not just knowledge but also skills: a public with better driving skills means an area less impacted by severe weather that affects road conditions.

Some organizations delegate emergency warning and emergency public information tasks to different groups or individuals, depending on the nature of their work, their relationship with the public, and the type of emergencies they handle. Preparing and disseminating information may, similarly, be two separate tasks. The public information officer (PIO) is a role found in many government organizations, serving a role similar to the public relations department in the private sector; very often PIOs are former journalists or journalism-school graduates, though increasingly, ideas from marketing and public relations are trickling into the profession at some organizations. This is less true with emergency services organizations, where community outreach and emergency preparedness/prevention may be a large part of the job but emergency public information remains the most important aspect of it. In some areas, police and fire departments and hospitals have separate public information officers; in others, emergency public information is consolidated in a single office.

Information can also include public service announcements (PSAs), which today are most associated with television and radio but which originated in newspapers during the Civil War and were an important part of the home front effort during World War II. Although PSAs are issued on a broad array of subjects to raise public awareness about various issues, many of them are concerned with emergency prevention or letting the public know what to do in a hypothetical emergency in order to increase the efficiency of response should such an emergency happen. Such PSAs were used to inform the public about the 911 emergency phone system as it was introduced in various parts of the country, for instance. PSAs may be nearly universal in their concern, such as those disseminating information about layman procedures for responding to health events like choking, heart attacks, or strokes, or disseminating broadly useful safety information about keeping children away from certain substances or avoiding downed power lines. They may also be local in their focus, familiarizing the viewer with local emergency services or warning about specific local issues, such as PSAs warning against shooting guns in the air to celebrate holidays in communities like New Orleans, where this is a cultural practice. PSAs may be made by government organizations, nonprofit groups, charitable organizations, or other groups; television broadcasters are required to devote a portion of their broadcast time to airing them.

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See Also: Civil Protection; Emergency, Definition of; Emergency Alert Systems; Emergency Operations Center; Information Vacuums; Mass Media; Preparedness; Public Relations; Spokesperson, Designating and Utilizing; Terrorism.

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Emergency Responders

Emergency responders (e.g., police, fire, health professions) play pivotal roles in managing crisis events such as acts of terrorism and disasters. They bring skills and competencies in key areas such as search and rescue, public order, and medical and mental health care developed in their routine work. However, differences between the contexts in which these competencies are normally used and those responders encounter when responding to crises means that training and development work is required to prepare emergency responders for the specific issues that arise in the alarm and deployment, response, and reintegration phases of crisis response.

Preparation

When responding to disasters and terrorist crises, emergency responders can find themselves facing atypical circumstances with little or no warning. This makes it important to train specifically for crises and to prepare for the implications of responding to them. Simulations and exercises that develop technical, psychological, and operational competencies are fundamental to building response capability and stress resilience in contexts that challenge assumptions and push boundaries. Simulations facilitate opportunities to develop technical and management skills, as well as response roles and responsibilities, and practice their application in realistic scenarios (e.g., infrastructure loss, multiagency operations, delegated responsibility, and information and decision management). They also afford opportunities to review plans, construct realistic performance expectations, rehearse translating plans into action, develop contingent capability to adapt to change, receive feedback on performance, and rehearse stress management strategies.

Given the difficulty of predicting what emergency responders could have to confront, training focuses less on events (e.g., earthquakes) per se and more on the event characteristics (e.g., physical danger, working in protective clothing, confronting biohazard agents, dealing with human remains, making complex and urgent decisions under conditions of uncertainty) that could occur across a range of events. For health care professionals, training would include performing clinical roles and triage under atypical circumstances and in ways that result in lower levels of patient care than would normally be expected. Training helps develop responders' capacity to render threatening experiences meaningful and facilitates effective performance by providing the competencies required to deal with atypical operating demands.

Emergency responders' experience of crisis events evolves over time as they progress through a series of stages, each with its own demands and characteristics. These stages are the alarm and deployment phase, the response phase, and the reintegration phase.

Alarm and Deployment

The alarm and deployment phase describes the period of comprehending and adjusting to a crisis event and mobilizing the emergency response. It involves, for example, accessing intelligence about what has occurred and making sense of often ambiguous information about the event.

In contrast to routine work, crisis events can introduce concerns about family safety. This is particularly so with terrorist acts where the potential for further attacks in unpredictable locations is present. Planning should advocate family preparedness and planning (e.g., support groups, access to antivirals, etc.) and, if possible, provide means for communication with families.

When deployed, responders' capabilities can be affected by transient factors such as health status (e.g., colds, flu), fatigue (e.g., deployed at the end of a shift), psychological fitness (e.g., occupational stress), and preexisting health issues. The personal and transient nature of these factors renders them difficult to manage. However, encouraging awareness of these limiting factors and their implications in training and advising of the importance of utilizing support resources can minimize their adverse effects on performance and well-being.

Initial problems accessing and comprehending information can result in responders being deployed before a full appreciation of the nature or implications of the event has been developed. This means that responders' understanding of events and its implications for how they utilize their plans, knowledge, and competencies evolves over the early period of their engagement. It is the responsibility of incident managers to clarify events and provide the structure required to move into the response phase.

Response

The effectiveness of response is influenced by organizational factors. For example, the more bureaucratic the organization, the more it persists in routine operational and decision procedures despite responding to different and urgent crisis demands. This results in inadequate consultation, poor communication, and excessive "red tape," making response to rapidly evolving issues more difficult. In contrast, organizations that develop crisis management procedures characterized by autonomous response systemsl flexible, consultative leadership; and practices that delegate responsibility and ensure that role and task assignments reflect incident demands facilitate an effective response. Deployment into crisis response roles differs from routine mobilization with regard to the fact that responders may find themselves working with both members of their own profession and representatives of other professions.

Team and Interagency Response

Crises present diverse problems and challenges. The need for these problems to be responded to simultaneously results in crisis response bringing together members of professions and agencies that rarely interact or collaborate normally. For example, the response to terrorist events could result in hazardous materials response teams; urban search and rescue teams; antiterrorism units; bomb squads; emergency management officials; private organizations responsible for transportation, communications, and construction; and medical and welfare agencies having to work together. The quality of response is a function of how well members of these agencies work together if required.

If members of different professions and agencies first come together during the crisis, the outcome is more likely to be conflict and a blurring of roles and responsibilities (e.g., regarding the lead agency, prioritizing problems). A capacity for cohesive response needs to be developed. Interagency team training can help deal with issues such as "turf protection," clarify interagency roles, and facilitate the development of a "super-ordinate group" whose membership reflects the collective role of all members in responding to complex, multifaceted crisis demands. This process culminates in the development of a team mental model that encompasses members' understanding of their respective contributions to the same plan and their shared understanding of each member's role in the response. This increases implicit information sharing during high workload periods, enhancing team capacity for adaptive response. This introduces a need to consider how information is accessed and used to make decisions in complex, evolving response environments.

Response Decision Management

In complex, multifaceted events, response effectiveness is a function of the capacity of responders to access, interpret, collate, and use nonroutine data and information from a variety of novel sources to interpret events and make response management decisions in effective and timely ways. The dynamic and complex nature of disasters and terrorist events introduces a need for several decision-making techniques. In complex, evolving settings, a level of creative decision making is required.

Where time permits, analytical decision making is the most effective technique. However, when time pressures are high, naturalistic decision making—where a responder recognizes the type of situation and, from previous experience, selects an appropriate course of action—is highly adaptive and is an essential competence. Interagency operations introduce a need for another decision-making technique.

Case Study: Emergency Responders in the United Kingdom

To respond to the growing need for search and rescue expertise in the aftermath of major crises and disasters, a United Kingdom organization was established to provide a volunteer resource in areas affected by large-scale natural disasters. Recruits were sought from the ranks of firefighters with several years experience in search and rescue work in domestic contexts. This approach to selection was informed by the assumption that the possession of appropriate search and rescue skills and experience would be sufficient preparedness for performing the same role in deployments of periods of two to three weeks in overseas disaster zones. However, early experiences led to the realization that this assumption was inappropriate. The disaster operating environment created unexpected operational and stress-related issues. Recognition of the significant implications that these issues had for team performance and well-being promoted a need for additional training to prepare responders for applying their search and rescue skills in crisis events.

Training needs analysis was conducted with responders who had experience of two deployments to different locations. This identified various issues that adversely affected performance. These included the level of destruction and infrastructure loss affecting performance, making normal management practices inappropriate, and reducing opportunities for effecting rescue; the level and duration of exposure to loss; injury and death sapping morale; conflict among team members and loss of interpersonal support; exhaustion from prolonged engagement in search and rescue work; conflict with search and rescue and aid groups; and media reporting. The last issue affected families back home and increased stress associated with concerns for the partner deployed to a disaster zone.

What was unexpected from the organizational perspective was that problems related less to people's technical skills and experience and more to how the environmental context affected both the performance and well-being of experienced responders. This prompted a need for training to develop the operational and team competencies required to function in these contexts.

The training needs analysis identified these issues as emanating from discrepancies between people's operational and performance expectations and the reality of disaster work. For example, the autocratic management style that proved effective when responding to domestic events was inappropriate for disaster settings. The scale of impacts meant it was difficult to adopt a command-and-control approach. Effective response called for participative planning and decision making to decide how and where to deploy the team. In contrast to normal circumstances, team members found themselves working alongside other search and rescue and aid teams. This created conflict and rivalries, confusion, and role and task ambiguity until some coordination of activities emerged on the ground. Responders also found themselves performing unexpected roles, such as media liaison about their successes and problems and finding themselves comforting relatives. Having to adapt to these issues affected performance and well-being. As a result, a training program was developed to prepare teams for such eventualities.

The training program was developed in collaboration between the external consultant brought in to conduct the training needs analysis and experienced team members. A decision was made that team members, rather than the consultant, would conduct the training. A significant benefit of using a train-the-trainer approach to delivering training was that trainers were able to reinforce the significance of issues (e.g., about emotional reactions). The training covered several areas. A combination of experienced disaster responders and video records was used to illustrate the operating context and the unique demands it made on personnel. The training addressed sources of stressors and advised of the normal emotional and psychological reactions that could be expected. It also sought to develop realistic and positive expectations about activities (e.g., recovering a dead body was not a failure for people who expect to rescue people), but something that gave families closure and opportunities to start the grieving process). Participative leadership and team management skills were taught. Buddy systems and peer support techniques were taught to allow members to provide social support in situ. Finally, outdoor survival training was conducted to develop physical and psychological resilience and contribute to team development.

Though not originally planned, an opportunity to evaluate the training arose when the team was deployed to a large earthquake in eastern Europe alongside a group of firefighters who had not received training in managing these contextual problems. This evaluation demonstrated that the training did enhance performance effectiveness. While not eliminating mental health problems, it reduced levels of stress experienced and hastened the rate of recovery, compared with those who had not been trained. Evaluation of the experience of both groups informed further training and organizational needs analyses and the development of the training and support programs.

The initial needs analysis identified family issues. These stemmed from concerns for a partner's safety when deployed, lack of contact, and increased stress and anxiety. Training and support programs were developed for family members. This involved advising family of how training enhanced the safety of team members. Family members were given opportunities to be involved during periods of deployment (e.g., administration, media liaison), and support groups were organized for family members during and after periods of deployment.

Distributed decision making recognizes the need for contributions from people who differ with respect to their profession, functions, roles, expertise, or level (e.g., operational versus tactical) of response management. Distributed decision making facilitates the capability of the multiagency team to utilize its collective expertise, even if contributing different perspectives, to manage the response. This is developed from exercises and simulations that contribute to developing a shared mental model. Responders' experience is also influenced by characteristics of the response environment.

Response Environment

The magnitude of the death and injury encountered, response constraints limiting the help available to casualties, and constant exposure to suffering illustrate the unique environmental characteristics responders can face. They may also face threats from, for example, disrupted sewer systems, working in unstable buildings, exposure to contaminated blood products, and threats (e.g., highly toxic chemical, biological, or radiation hazards) associated with biohazards or dirty bombs. The scale of destruction increases the risk of death in emergency response personnel. Death or serious injury to a colleague can amplify stress risk associated with an already hazardous environment.

Environmental factors such as heat, noise, or poor visibility affect performance and stress risk, as do the sights, sounds, and, especially, the smells encountered. The demands associated with environmental factors such as heat may be significant—and unexpected—as a result of the need to wear protective suits and breathing apparatus to protect from, for example, biohazard agents or toxic dust. This may be less problematic for groups such as firefighters who regularly use protective clothing and breathing apparatus but can be a significant stressor for those (e.g., police, EMT personnel) for whom this would represent a highly novel demand. The need for protective clothing contributes to stress risk directly (e.g., their use being necessitated by exposure to biohazards) and indirectly (e.g., increased heat stress and problems operating equipment).

The scale and nature of disasters and terrorist events means that emergency responders cannot perform at the level they would have expected (e.g., inability to rescue everybody as a result of limited resources, decisions resulting in some people not being helped). This can result in performance guilt. However, training that develops realistic outcome expectations and accommodates situational constraints on performance facilitates performance and well-being.

Stress risk is particularly pronounced when performing body recovery and identification duties.

Positive interpretation (e.g., interpreting body recovery duties in terms of their role in assisting families to begin the grieving process) can facilitate adaptation. Training and experience in handling body remains lessens stress in those exposed to this activity for prolonged periods. The final phase of emergency response commences with the cessation of the crisis role.

Reintegration: From Crisis to Routine

Reintegration describes the transition back into the "normal" roles and routines of work and family life. Key activities during this phase include managing any mental health consequences and reviewing performance. With regard to the former, it is worth noting that vulnerability is not restricted to those who had negative event experiences. Positive response experiences can manifest as stress reactions during reintegration if, for example, responders experience a conflict between a period of rewarding professional performance and readjusting to routine work and catching up with any backlog of work and dealing with reporting pressures.

Unique sources of stress during reintegration can arise from public and media scrutiny and sociolegal processes. For example, responders may have to contend with blame being directed at them (e.g., media accounts regarding event preventability, response effectiveness). Managing stress reactions from response and reintegration sources is important.

During reintegration, stress management centers on helping responders render atypical, threatening experiences meaningful. Resources such as coworker and peer support can be effective, as can communal coping. This is characterized by members' collective acceptance of responsibility for event-related problems and the existence of mechanisms by which they can cooperate to resolve problems. Acknowledging and building on effective collaboration during the crisis, and working together after the crisis, to develop understanding and enhance future preparedness helps mitigate stress and develop future resilience. Because stress issues can extend to include family members, organizations should develop family-friendly policies, family support groups, and family recovery plans to address this issue. The organizational context in which reintegration occurs has additional implications.

The Organizational Context

Event reviews and stress recovery are complicated if they occur in an organizational culture that discourages disclosure of event issues and emotions and focuses on attributing blame to responders for problems occurring during response. Positive reintegration experiences are more likely if managers actively promote and manage reintegration. This is particularly important with regard to issues arising from critical public and media scrutiny regarding event causation (e.g., beliefs that police were less vigilant than they should have been) and response management (e.g., beliefs that response could have been faster or involved inadequate resources).

Managers can assist adaptation by helping responders appreciate that they performed to the best of their ability. Managers can also facilitate positive resolution by assisting staff to identify the strengths that helped them deal with the crisis event and building on this to plan how future events can be dealt with more effectively. Such activities promote future response effectiveness and contribute to the development and maintenance of a resilient organizational climate and the development of training, development, and support practices that will enhance future response capability.

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See Also: Agency Notification and Mobilization; Blame, Politics of; Civil Protection; Command and Control; Debriefing; Decision Making Under Stress; Health and Medical Response Scenarios; Incident Management; Interoperability; Operational Plans; Pre-Crisis Training and Planning; Response Team.

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Emergency Support Functions

An emergency support function is a grouping of government and private-sector capabilities into an organizational structure to provide the resources that are most likely to be needed in responding to and recovering from a disaster. Each function has a designated coordinator for developing plans and one or more primary agencies designated for implementing those plans during a disaster. Originally developed as a mechanism of federal response, the emergency support function concept has been adopted by many state and local governments.

Concept and Evolution

The emergency support function concept was developed in response to the need to coordinate complex response activities by multiple federal agencies responding to earthquakes in California. As part of its earthquake planning responsibilities, Region IX of the Federal Emergency Management Agency (FEMA) conceived the idea of identifying the federal resources and services most likely to be needed following an earthquake and grouping them into functional categories. Each of these functional categories was assigned to a primary federal agency that had responsibility for developing plans to implement the function and for coordinating field activities related to the function during disasters. Other agencies that could contribute resources were identified as support agencies and agreed to provide planning assistance to the primary agency and to accept the primary agency's coordination role in implementation. This concept was incorporated into the National Plan for Federal Response to a Catastrophic Earthquake in 1985.

Following passage of the Stafford Act in 1988, the director of the Federal Emergency Management Agency was authorized to develop a plan to coordinate all federal response to disasters. The initial product of this planning effort was the Natural Disaster Response Plan in 1989, followed by the Federal Response Plan in April 1992. Both plans incorporated the emergency support function concept, solidifying its role as the principal federal response coordination mechanism.

The Federal Response Plan and the emergency support function concept were implemented almost immediately in Hurricane Andrew in Florida in August 1992 and in Hurricane Iniki in Hawaii in September 1992. Although the response to Hurricane Andrew was considered inadequate, the after-action report by the National Academy of Public Administration noted that the Federal Response Plan was an important step in coordinating federal disaster relief. The response to Hurricane Iniki went smoother as the federal staff adapted a number of mechanisms from the Incident Command System to coordinate activities among the emergency support functions.

With the formation of the Department of Homeland Security following the terrorist attacks in 2001, senior officials determined that the Federal Response Plan needed to be revised. The result was the National Response Plan issued in 2002. The new plan was not well received because of limited input from state and local governments during its development and was revised in 2006 to address problems identified during the response to Hurricane Katrina in 2005. The National Response Plan was quickly superseded by the National Response Framework, issued in 2008. Although there were changes made to the number and composition of the emergency support functions, each of these plans retained the emergency support function concept as the principal coordinating mechanism for federal response.

Federal Emergency Support Functions

The emergency support function concept has been a constant through all the various iterations of national coordination plans. However, the number and composition of the emergency support functions have changed. The Federal Response Plan identified 12 emergency support functions. This number was increased to 15 in the National Response Plan and the National Response Framework (see Table 1).

These changes have been necessitated by the changing demands for assistance, coordination issues identified in the field, and, in some cases, interagency politics. For example, the need for law enforcement aid to local governments following several response operations in the U.S. Virgin Islands led to the creation of ESF 13 Law Enforcement. Similarly, the title of ESF 6 changed from Mass Care to Mass Care, Emergency Assistance, Housing, and Human Services, and coordination responsibility was shifted from the American Red Cross to the Federal Emergency Management Agency. These changes reflected the increased levels of humanitarian assistance required in large events that go beyond simple congregate sheltering.

In addition to increasing the number of functions, successive federal plans also have made changes to previous functions and reassigned primary agencies. However, the single biggest change has been the dilution of the primary agency role. Where the Federal Response Plan identified a single primary agency for each emergency support function, the National Response Framework has as many as four primary agencies for each function. In addition, the National Response Framework also designates a coordinator position for each function, which may or may not be the primary agency, to develop plans prior to disaster activation.

Adoption by State and Local Jurisdictions

Although the emergency support function concept has been around for a number of years as the principal federal response coordination mechanism, few states and even fewer jurisdictions were inclined to revise their emergency operations plans

Table 1 Emergency support functions

Emergency support function	Federal response plan 1992	National response plan 2002	National response framework 2008
1	Transportation	Transportation	Transportation
2	Communications	Communications	Communications
3	Public works and engineering	Public works and engineering	Public works and engineering
4	Firefighting	Firefighting	Firefighting
5	Information and planning	Emergency management	Emergency management
6	Mass care	Mass care, housing and human services	Mass care, emergency assistance, housing and human services
7	Resource support	Resource support	Logistics management and resource support
8	Health and medical services	Public health and medical services	Public health and medical services
9	Urban search and rescue	Urban search and rescue	Search and rescue
10	Hazardous materials	Oil and hazardous materials response	Oil and hazardous materials response
11	Food	Agriculture and natural resources	Agriculture and natural resources
12	Energy	Energy	Energy
13	–	Public safety and security	Public safety and security
14	–	Long-term community recovery and mitigation	Long-term community recovery
15	–	External affairs	External affairs

to incorporate the concept. Part of the reason for this was that there was no incentive from the federal government to do so. Further, *State and Local Guide 101: Guide for All-Hazard Emergency Operations Planning*, the definitive guide on emergency plan development, made no reference to the emergency support function concept.

This would change in 2008 with the publication of an interim edition of *Comprehensive Preparedness Guide 101: A Guide for All-Hazard Emergency Operations Planning for State, Territorial, Local, and Tribal Governments*. This document and the current version, *Developing and Maintaining Emergency Operations Plans,* published in 2010, offer three formats for emergency operations plans: a traditional format, the emergency support function format, and an agency-based format.

Several other factors have contributed to the interest of local government in moving to the emergency support function concept. The implementation of the national incident management system (NIMS) is a major attempt to standardize response efforts across the country. As part of this implementation, local governments have been encouraged to mirror the National Response Framework as closely as possible. Following the problems of Hurricane Katrina, the Department of Homeland Security has engaged in a major effort to review and revise state and local emergency operations plans. This initiative has included a series of nationwide plan reviews and funding for revising emergency operations plans. The combination of funding and federal emphasis has resulted in many jurisdictions revising their plans to incorporate the emergency support function concept.

Suitability for State and Local Governments

Use of the emergency support function concept by state and local governments offers some advantages but also raises some concerns. Despite its relative success at the federal level, there are no empirical studies demonstrating the effectiveness of the concept at any level of government. The emergency support function concept evolved to meet a specific need: the integration of multiple federal agencies into a single disaster response framework. Although there would seem to be similar needs at state and local levels, there are qualitative differences that may make the concept difficult to apply in smaller jurisdictions.

Even at the federal level, agency resources are such that emergency support functions are seldom staffed by multiple agencies. Consequently, there is a tendency to identify the function with an agency. That is, the representative of a primary agency for an emergency support function may also be the point of contact as a supporting agency for other emergency support functions.

Several of the functions identified may not be necessary for a smaller jurisdiction. For example, the functions of ESF 7 Resources Support may already be integrated into the response framework established by the jurisdiction. It has also been suggested that some of the emergency support functions identified in the National Response Framework have pre-disaster planning functions but only limited disaster response roles (e.g., ESF 5 Emergency Management). This raises the questions of standardization and whether jurisdictions are free to create their own emergency support functions or change titles and numbering.

Another potential problem with the emergency support function concept is that tasks requiring multiagency response can become diffused across multiple annexes. This is can be addressed by the development of a support annex that describes the overall concept for the task, with the emergency support function annexes describing the specific responsibilities of each function. However, *Comprehensive Preparedness Guide 101* states that support annexes identify a coordinating agency and assisting and cooperating agencies in addition to describing the mechanism for coordination and execution of common strategies. It does not address the interface between the support annex and the emergency support function annexes. Synchronizing these multiple annexes creates a significant planning burden for a small jurisdiction.

The emergency support function concept does not align with the incident command system mandated by the national incident management system. The National Response Framework places the emergency support functions under the Operations Section. This is appropriate where the role of the functions is to provide external support to affected jurisdictions. However, the agencies at the local level have this external support role

Case Study: Emergency Support Functions for the 1994 Northridge Earthquake

At 4:31 A.M. on January 17, 1994, Los Angeles, California, was struck by a magnitude 6.7 earthquake that killed 57 people, injured 8,700, and caused over $20 billion in damage. Within the hour, Federal Emergency Management Agency (FEMA) Region IX activated its regional operations center. The regional operations center staff included a representative from each emergency support function primary agency. These representatives were largely drawn from the Regional Interagency Steering Committee, a planning group that met regularly to develop implementing strategies for the Federal Response Plan. The members were well known to each other and had worked together on previous disasters in Region IX.

These representatives were tasked with gathering as much information as possible about the impact of the earthquake and with determining and alerting potential resources. Some representatives were given immediate mission assignments or activated resources under pre-existing agreements. For example, ESF 9 Urban Search and Rescue began assembling and deploying an overhead management team and activated the standby search and rescue teams for immediate deployment.

As the team at the regional operations center worked on assessments, FEMA assembled and deployed an advance team to southern California that included primary agency representatives from the emergency support functions. The advance team established a disaster field office in Pasadena and assumed control of the response from the regional operations center by the day following the earthquake.

Within the field office, the emergency support functions established work areas in the Operations Section. Although the Federal Response Plan identified a primary agency and multiple support agencies, most emergency support functions were staffed by the primary agency. In some cases, this was a single individual, and the emergency support functions were sometimes identified by the staffing agency rather than by number. For example, ESF 6 Mass Care was usually referred to as "the Red Cross." In addition, some primary agencies also provided resources to other emergency support functions. For example, the U.S. Forest Service was the primary agency for ESF 4 Firefighting and also provided staff to ESF 5 Information and Planning.

Previous experience in Hurricane Iniki in Hawaii in 1992 had led to the establishment of two important mechanisms for coordinating the activities of the emergency support functions. The first was a daily coordination meeting facilitated by ESF 5 Information and Planning. The coordination meeting focused on identifying problem areas and assigning lead and supporting agencies to each problem area. Primary agency representatives received a short update on the current situation, supplemented by a daily activity report and briefing package, and then were asked to briefly describe problems areas with which they needed assistance. The Operations Chief then assigned support resources and progress was tracked at subsequent meetings.

The second critical mechanism was a documented mission assignment process. Federal funding for disaster activities was funneled and tracked through FEMA. Agencies could not seek reimbursement for any operational expenses without a specific request by FEMA. Although the mission assignments were generally given to the primary agency, it was sometimes necessary to directly mission assign a supporting agency, making the mission assignment process cumbersome and hard to track. Delays in providing mission assignments had created problems in previous disasters, and the Operations Branch had developed a system to avoid this in the Northridge response.

A significant advantage for the emergency support functions was the large amount of resources available to the state of California's Office of Emergency Services. The state attempted to merge its field operating structure with that of the federal team as much as possible. For example, the state plans unit was collocated with ESF 5 Information and Planning, and information was freely exchanged between the two units. The state was also able to assign agency representatives directly to the emergency support functions, thereby creating multi-jurisdictional teams.

Resource requests from the affected area were provided first to the Operations Chief, who determined the appropriate emergency support function to provide the needed resources. Within the emergency support function, the state and federal representatives determined which federal or state resources were most readily available, requested a mission assignment tasking, and then implemented the agreed-upon course of action.

The use of the emergency support function concept in the response to the Northridge earthquake proved highly effective for a variety of reasons. The previous working relationships established among the primary agencies meant that problems or gray areas within the Federal Response Plan could quickly be addressed. The same was true with the state agencies, as many had preexisting relationships with their federal counterparts. The use of ESF 5 Information and Planning as a plans unit allowed the consolidation of information from the emergency support functions, making it accessible to any agency. The use of facilitated planning meetings and mission assignment tracking, along with a close working relationship between the emergency support functions and their state counterparts, avoided duplication of effort and ensured that relief was provided as quickly and efficiently as possible.

and an additional internal support role under the Incident Command System. For example, agencies assigned to ESF 7 Resources Support at the federal level deploy resources to the disaster area. At the local level, these agencies will most likely be assigned to the Logistics Unit. The emergency support function concept does offer considerable value as a planning tool, however. Identifying critical response functions, identifying agencies associated with those functions, and designating a primary agency with responsibility for planning and implementation of tasks to accomplish the functions in effect creates a task force that can be highly effective. Of particular value is the ability of the concept to integrate not only public-sector agencies but the private sector as well.

It is this use as a planning mechanism that gives the emergency support function concept its true value. During response operations, the emergency support functions serve essentially the same purpose as previous coordination mechanisms, although their efficiency is greatly improved by preoperations planning. However, the existence of preidentified teams with clearly defined responsibilities and leadership allows for the expansion of the emergency support concept beyond just emergency response. The emergency support functions offer pools of expertise that can be used to enhance mitigation and recovery planning and can provide support to lower-level emergencies that do not rise to the level of disasters. Consequently, judicious use of the emergency support concept can be used to bolster overall organizational resilience.

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See Also: Coordination; Emergency Management Agencies, City and County; National Incident Management System (NIMS); National Response Framework; Operational Plans.

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Environment Programme, UN (UNEP)

The United Nations Environment Programme (UNEP) is the environmental extension of the United Nations (UN). The UNEP fosters and advances partnerships between diverse actors, including other international organizations, national governments, nongovernmental organizations (NGOs), and the private and public sectors.

The UNEP advocates the protection of environmental resources in tandem with the promotion of development initiatives that improve the quality and standard of living for member countries.

Formation and Mission

The UNEP, established in December of 1972 through the UN General Assembly Resolution 2997 (27), was born out of the UN Conference on the Human Environment in Stockholm, Sweden, held in June of that same year.

The UNEP's mission statement is "To provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations."

Structure and Roles

To meet its mission statement, the UN employs a secretariat of approximately 900 individuals. These staff members function as an executive department, applying the budgeted priorities of the UNEP, such as policy implementation.

The Governing Council (GC) of the UNEP, comprising 58 representatives from UN member states, is tasked with the diplomatic aspects of the program, such as facilitating collaboration between and within the UN and other agencies. The GC also authors the primary environmental policies of the UNEP, which are executed by the secretariat.

Representatives are elected by the UN General Assembly (GA) for three-year terms and are delegated based on six geographical regions. The GA also elects the UNEP executive director to a four-year term. The UNEP executive director is traditionally nominated by the UN Secretary-General.

The UNEP is headquartered in Nairobi, Kenya, and supported by six regional offices located in Africa, Asia and the Pacific, Europe, Latin America and the Caribbean, North America, and west Asia. Each area is overseen by a regional director, who works in tandem with the nine members of the UNEP senior management team, overseen by the executive and deputy directors.

The UNEP is tasked with a series of important roles, which include (1) monitoring and evaluating known and potential environmental threats; (2) anticipating and preparing for future environmental crises; (3) conducting scientific research; (4) disseminating this research through reports, books, and popular media; (5) organizing and hosting regional and international conventions on relevant environmental issues; (6) raising global awareness on crucial environmental issues; (7) promoting joint environment-development projects; (8) developing and implementing regional and international environmental policies; (9) assisting member states in achieving environmental goals and meeting environmental mandates; and (10) coordinating environmental efforts with other arms of the UN.

These roles are administered through the following environmental priorities of the UNEP: climate change, resource efficiency, disasters and conflicts, environmental governance, harmful substances and hazardous waste, and ecosystem management.

Accomplishments

One of the primary challenges facing the UNEP concerns its institutional capacities, which are limited in scope by insufficient funding. Another difficulty includes traversing the diversity of political landscapes that constitute the body of its constituency. In spite of these challenges, several major global environmental accomplishments have been brought to fruition.

One of the UNEP's most widely recognized global achievements is the Montreal Protocol, an international environmental treaty established in 1987 to combat the destruction of Earth's ozone layer. The UNEP is also credited with the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988, and with the introduction and dissemination of the "sustainable development" concept through *Our Common Future*—a special report by the Brundtland Commission.

The UNEP is lauded for organizing the UN Conference on Environment and Development in 1992. Also known as the Earth Summit, the conference is recognized for a concerted effort to conflate economic development with environmental protection, through a report titled *Agenda 21*. More recently, the UNEP has been instrumental in advancing the Kyoto Protocol, first introduced in 1997. The document is an environmental treaty, international in scope, with the goal of stabilizing greenhouse gases that are contributing to global climatic changes. These accomplishments demonstrate the UNEP's ability to coalesce different actors, agencies, and governments around environmental issues of a global scale.

Criticisms

Many of the critiques lodged against the UNEP stem from the program's ambitious mission statement, its large constituency, and the scale of the issues it addresses. In particular, the UNEP is often accused of being an ineffective and poorly organized juggernaut. Its lack of a long-term plan, coupled with largely qualitative goals, renders meaningful organizational evaluations difficult or impossible. Furthermore, it is not an independent agency with autonomy in decision making but instead reports to the UN General Assembly.

Many criticisms are linked to issues of UNEP funding, which is not guaranteed but supplied by entirely voluntary contributions from its member nations. This issue of disproportionate financing has resulted in an unrepresentative distribution of lobbying power and influence by some nations within the program, which also reduces program autonomy.

Dissatisfaction with the organization, led primarily by accusations of ineffectuality, led to a situation whereby 46 countries supported and signed a document titled *The Paris Call for Action*. This document advocated the dissolution of the UNEP and its replacement with a new organization called the United Nations Environmental Organization (UNEO). Signing countries believed the UNEO, if structured in a fashion similar to the World Health Organization (WHO), would be more effective and less constrained than the UNEP as currently structured.

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See Also: Climate Change Adaptation; Global Warming; Hazardous Waste Disposal; Ozone Layer Depletion; Policy Setting; Public Awareness and Education; Resource Management; Sustainability; World Health Organization (WHO), UN.

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Environmental Contamination

Since the industrial age, a major threat to the health of human beings and wildlife has been threaded by environmental contaminants. Environmental contaminants found in water, air, or soil are either human-made or natural. The risk associated with exposure to chemicals cannot be quantified or assessed. The risk of chemical exposure resulting in some form of injury may have by far better results in stored historical data, whereas assessing the risk of chemical exposure with no immediate form of injury has less observed data. Risk assessment examines hazard identification, dose-response assessment, exposure assessment, and risk characterization to characterize the nature and magnitude of health risks to humans, animals, and crops from chemical toxicants and contaminants. In hazard identification, the nature

Inside the Caribbean Petroleum Corporation (CAPECO) explosion perimeter in Cataño, Puerto Rico, a firefighter adjusts respiratory gear, October 24, 2009. The explosion and fire at CAPECO produced an environmental contamination crisis with a toxic fire, which took firefighters over two days to extinguish. There were fuel leakages into neighboring waterways, soil contamination, and hazards to public health. An investigation revealed CAPECO had been cited multiple times for serious environmental violations.

of toxicity of chemicals to human and animals is determined in terms of its quantity. For instance, exposure to nuclear power causes thyroid cancer. The relationship between the amount of exposure and the effect of a toxin is measured by dose-response assessment in risk management. Exposure assessment measures the amount and length of exposure to chemicals from consuming water, eating food, or inhaling polluted air. Any adverse health effects and their potential incidence are estimated by risk characterization, which measures the likelihood of a population's exposure to some given type of chemical.

The environmental risk assessments of contaminants fall into two areas of human health and ecology to find how much a chemical is present in an environment or how much a person or ecological receptor is in contact with or at risk of exposure to the contaminated environment and, more important, how toxic the chemical is. Chemicals can be less toxic if the dose is low enough.

Who Evaluates the Risks?

If risk assessments provide information on the potential risk in health and the environment, risk management is the action taken based on considerations made under risk assessment, scientific factors like toxicology and statistics, economic factors to inform managers of the cost of toxicant risk present in the workplace and benefits of reducing it, laws and legal decisions, social factors like community values, land use and zoning, and public values that reflect the society as a whole and their attitudes on risk management and assessment.

Various federal agencies such as the U.S. Environmental Protection Agency (EPA) are responsible for assessing and managing risks associated with stressors. The EPA's Office of Air and Radiation (OAR) is responsible for air pollution stressors; the Office of Solid Waste and Emergency Response for hazardous substance, pollutants, and waste; the Office of Pesticide Programs (OPP) for pesticides; radiation programs responsible for radiation including radon; the Office of Pollution Prevention and Toxic (OPPT) for human exposure, environmental exposure, and toxic substances; the U.S. Consumer Product Safety Commission (CPSC) for pesticides; and the Food and Drug Administration (FDA) for pharmaceuticals and vaccines.

Human-Made Chemicals

Most human-made chemicals are colorless, tasteless, and odorless and are hardly detectable. Synthetic organic chemicals (SOCs) such as pesticides, herbicides, and insecticides, and volatile organic chemicals like solvents and gasoline, are human-made chemicals found in the environment. Because of improper storage, use, or disposal of chemicals, the safety of soil and especially drinking water can be of concern. Cleaning up water after contamination is costly and more difficult than preventing water from contamination in the first place. Human-made, industrial, and manufacturing chemicals, pesticides, and ammunition wastes along with grain fumigants, have been detected in groundwater systems and in soil. Environmental contaminants, many of which are human-made chemicals, are found in nature and act as hormones or antihormones and endocrine-disrupting contaminants (EDCs). As a result of the introduction of EDCs by humans and their activities, modified reproductive anatomy, altered fertility, and impaired hormone secretion have been seen in wildlife. Studies at the Marine Environmental Research Institute (MERI) show that human-made toxic chemicals and compounds seen in cars, homes, and schools have been found in Maine harbor seals' bodies. These toxic compounds found in seals' bodies are among the highest in the world in terms of toxicity. Toxic compounds such as dioxins, DDTs (dichlorodiphenyltrichloroethane), mercury, pesticides, and polychlorinated biphenyls, along with organic pollutants, have been found in the seals' bodies; many of these toxicants are persistent in terms of entering the food chain and can be recycled for decades. We are consuming the same kinds of fish that seals eat, such as mackerel, flounder, and hake.

Drinking Water Contaminants

Contamination of water has been a concern to the public for years. Water contaminants can be characterized as microorganisms, disinfectants, disinfection by-products, inorganic chemicals, organic chemicals, and radionuclides. In the United States, concern has been increasing over the outbreak of some of these microorganisms such as cryptosporidiosis, giardiasis, coliform bacteria, and hepatitis A. Coliform is a bacterium that lives in soil or vegetation and mostly enters the water streams by direct disposal of waste into the streams. A human's immune system determines whether the person will get sick or not. Many people become immune to these types of bacteria even if they are found in the drinking water. In case the body is not immune to it, diarrhea or gastroenteritis can be experienced. The presence of coliform bacteria can indicate the contamination of water by other microbes. Coliforms act as indicators of possible contamination. Giardia lamblia is another type of waterborne parasite and causes giardiasis. Giardiasis is a disease that causes diarrhea, abdominal cramps, weight loss, and nausea for a week and, in some cases, can also cause chronic infection. Cryptosporidium is a parasite that causes the disease of cryptosporidiosis, which has been seen in the past five years. Over 400,000 people were ill with the disease after drinking contaminated water in 1993. The symptoms can occur within two to 10 days after the infection; symptoms include headache, diarrhea, nausea, vomiting, and fever.

Other sources of contaminants in drinking water are disinfection by-products such as bromate, chlorite, and haloacetic acids, which can increase risk of cancer and nervous system effects with long-term exposure in adults, infants, and young children. Other disinfectant contaminants found in drinking water are chloramines, which cause eye and nose irritation, stomach discomfort, and anemia, and chlorine dioxide, which also affects the nervous system in infants and young adults. Among the inorganic chemicals, arsenic, antimony, barium, beryllium, cadmium, chromium, copper, fluoride, lead, mercury, nitrite, selenium, and thallium are sources of contaminants in drinking water that have serious potential health effects such as increase in blood cholesterol, decrease in blood sugar, skin damage, cancer, kidney damage, allergic dermatitis, nerve damage, thyroid problems, and high blood pressure from long-term exposure. Organic chemicals enter the drinking water system either during wastewater treatment, leakage from linings of water storage tanks and distribution lines, discharges from factories, or runoff from herbicides used on row crops.

Contaminants in Soil

Pollution is caused in soil by the presence of human-made chemicals as either solid or liquid hazardous substances mixed with soil matter. Contaminants in the soil can hurt plants, animals, and humans and have adverse impacts on their health. Animals and humans can ingest, inhale, or touch contaminated soil or eat plants that are already affected by contamination. The main source of contamination in soils is from industrial wastes, underground storage tanks, application of pesticides, oil and fuel dumping, leaching of waste from landfills, and disposal of coal ash. Large quantities of trace metals from coal combustion, ash residues, and wastage of commercial products are other sources of contamination in soil. A trace metal found in municipal sewage sludge can easily contaminate the soil. Municipal sewage embodies an important source of metal contamination in land. There are health risk concerns with soil contamination in terms of direct contact with contaminated soil or any vapors from the contaminated soil and contamination of water underlying the contaminated soil. Human consumption from groundwater aquifers contaminated by infiltration from contaminated soil, inhalation of vaporized soil contaminants, or direct contact with soil have health consequences. Health consequences from exposure to soil contamination can vary depending on the level of exposure, the type of pollutant, and the pathway of attachment, but any chronic exposure to chromium, petroleum, pesticides, lead, and other metals can cause congenital disorders and chronic health conditions.

Sources of Soil Contamination

The property of soil varies from place to place and can be easily influenced by many factors. Human activities put the most harmful substances in the soil. The properties of soil are affected by past and current land uses. For instance, because of poor storage practices or spillage in gas stations and mechanics' garages, there are contaminants such as fuel and lubricants that enter the soil inadvertently. The properties of soil can also be contaminated by indirect sources such as rain runoff from roads and buildings, which can introduce heavy metals such as mercury and lead. Some general sources of contamination in soil are paint, high traffic areas, treated lumber, burning wastes, manure, coal ash, sewage sludge, petroleum spills, commercial/industrial site use, and pesticides. Through these general sources, lead, zinc, PAHs (polycyclic aromatic hydrocarbons), arsenic, copper, dioxins, sulfur, cadmium, benzene, toluene, xylene, heavy metals, and mercury are introduced into soil.

Acceptable Levels of Contamination in Soil

Certain chemicals naturally exist in soil as components of minerals, but the soil contaminants in urban settings exceed the natural level. The evaluation and cleanup of contaminated soil is based on soil screening levels (SSLs), determined by the EPA. Since there is no single standard that can define the acceptable level of contaminants in soil, SSLs are a general guide in directing resources for site evaluation and cleanups. Of the industrial, residential, and agricultural use standards, the agricultural standard is the strictest, since the contaminants present in soil have to be at minimal levels to grow food. Excavation of soil from the ground with the purpose of treating or disposal, containment of soil in place, and soil treatment in place are three general approaches to cleaning up contaminated soil. In some cases, contaminants are flushed out of the soil using water and chemical solvents, or encapsulated by adding materials to the soil to prevent chemicals from spreading.

Contamination in the Air

The action of environmental contamination with human-made or natural contaminants is pollution. By introduction of contaminants into an environment, the ecosystem becomes unstable. The discomfort, disorder, and instability in an environment caused by introduction of contaminants by release of chemicals and particulates into atmosphere is called air pollution. Pollution in the air can be odorless and colorless or can be apparent in the form of smog. The main contributors to pollution are industries. Most of the greenhouse gases are released into the atmosphere by factories. Many of these gases and the gases released from burning fossil fuel are harmful and have significant health and environmental effects. The Big Six air pollutants are carbon dioxide, carbon monoxide, sulfur oxide, nitrogen oxide, hydrocarbons, and particulates. These gases are primary pollutants and can affect the environment directly. Other gases like nitrogen oxide and sulfur are secondary pollutants and can react with other chemicals like water and become more harmful to the environment in the form of acid rain in the atmosphere. Pollution can affect everyone on Earth and is a global crisis.

Effects of Pollution on Human Health

Adverse air quality can cause respiratory disease, congestion, and cardiovascular disease. Air pollution can be a nuisance and can be injurious to human life, animals, and even vegetation. All over the world are premature deaths resulting from air pollution, and studies show that more than 50,000 people die in the United States annually because of air pollution. Air quality not only affects the health of the environment and the health of the community but also has a direct influence on our lifestyle. Therefore, the quality of life depends on the pressures on our air and our responses to it. Short-term and long-term exposure to greenhouse gases has diverse health effects on humans. Short-term exposure to carbon monoxide causes the carrying capacity of oxygen in the blood to reduce and can cause damage to the nervous system and the heart. Over time, exposure to ozone gas can cause decrease in lung function and increase the chances of asthma and other respiratory symptoms. Exposure for a short period of time to nitrogen oxide causes respiratory illnesses in children; respiratory infection in adults can result after long-term exposure. Nitrogen dioxide can also cause death in plants and damage to crops. These gases are formed when fuels are burned by human in large cities.

Possible Approaches for Crisis Managers

Environmental issues are diverse, and different factors or situations can lead to an environmental crisis. Therefore, it is very important to call for multidimensional approaches in order to combat any environmental perturbations. In general, there are two ways to approach crises as unfortunate events: (1) keeping events from reoccurring and (2) lessening the impact of the crisis by softening or mitigating them. Although a crisis is a low-probability event, it can have a high-damage impact; therefore, being aware of the scope of the vastly negative impacts of various crises should be the goal of the environmental crisis manager. As crisis prevention is a broader concept of pre-crisis management and can be used as type of control management, the three broad areas where crisis management can contribute to the prevention of any environmental crisis are to (1) proactively address the underlying systemic causes of a potential crisis, (2) establish signal mechanisms to detect a foreseen crisis, and (3) learn and understand the ongoing basis of any crisis. Since the fundamental step of combating environmental crises is to recognize the warning signs or trends of events and respond to them properly and promptly, learning from crisis and preparation are the keys to success.

In dealing with an environmental crisis that can pose an extreme danger to not only the environment but also public health, it is very important for managers to effectively deal with every aspect of the crisis and be able to identify audiences who are affected by the event. In planning for crisis management, managers classify the potential crisis situations, identify those who would be affected, and minimize damage by testing formulated strategies and tactics for dealing with potential crises.

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See Also: Chemical Risk; Deforestation; Electronics Waste; Environment Programme, UN (UNEP); Hazardous Materials; Hazardous Waste Disposal; Mining; Ozone Layer Depletion; Petrochemical Risk; Sewage Spill; Smog.

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Epidemics

Epidemics can be defined as disease outbreaks that occur within given geographic areas, such as communities, villages, states, or territories, that spread to other areas. Epidemics can be caused by microorganisms (germs) in the form of bacteria, viruses, fungi, protozoans, or parasites.

Comparably, endemics are diseases that occur routinely within villages, states, or small regions. For instance, the plague is endemic to the mountainous regions of the western United States, and malaria is endemic to the tropical areas of the world. Endemic diseases can easily spread to other regions by various means. These include by travelers, through commerce, or by animals. Additionally, viruses have the ability to mutate once they encounter environmental changes or combine with other strains inside a host.

Epidemics can easily become pandemics if the outbreak of disease affects larger regions or other areas of the world. These outbreaks may involve any number of diseases, including influenza, severe acute respiratory syndrome (SARS), malaria, tuberculosis, and smallpox.

Origins and Outbreaks

Humankind has documented evidence of disease outbreaks occurring throughout the world since the development of written records. Hippocrates documented an outbreak of deadly influenza occurring throughout Greece and neighboring countries in 412 B.C.E. An outbreak of leprosy also occurred during this time and has been documented in both literary and religious works. Smallpox affected the New World just as George Washington and the Continental army battled British troops.

Both sides suffered tremendous losses from this epidemic. Physicians developed crude methods of inoculating both soldiers and the public by using variolation. These physicians captured matter from the pustule of an infected person and placed it beneath the skin of an unaffected person, potentially causing immunity. This also served to reduce the size of the outbreak, thereby potentially saving thousands of lives.

A majority of disease outbreaks remain localized (endemic) or regionalized (epidemic). However, others can spread globally, which is defined as a pandemic. Disease outbreaks typically follow a cycle, beginning with infection of a population, either on a small or large scale, severe illness, or eventual death of the host. A host can be most any animal, from migratory waterfowl to humans. Viruses often die themselves once they have run their course. Humans have the ability to develop immunity to bacteria or virus strains once they have become infected and survived the illness. Unfortunately, bacteria or viruses have the ability to mutate or evolve into new, more deadly strains. Humans typically do not have immunity from these new strains, which can potentially lead to an epidemic. Examples include the 1918 Spanish influenza, which begin as an epidemic and eventually resulted in over 40 million deaths. Similar epidemics occurred in 1957 and 1968. Most recently, an outbreak of avian influenza (H5N1) and swine influenza (H1N1) occurred in 2009 and 2010. Each of these is a variation of influenza Type A.

Epidemics not only affect individuals from a medical standpoint but can also affect them economically. Because commerce is totally dependent on people, the economy can quickly become stagnant if people are not purchasing goods and services. This can lead to a global recession. Moreover, people are needed to sell these goods, operate stores, and provide routine services such as fuel and water delivery.

During the 1918 influenza outbreak, manufacturing processes were not as technologically advanced as they are today but instead were heavily dependent on human beings. If people were sick, products could not be manufactured. In the United States, hundreds of stores, utilities, shops, and public services closed or came to a halt. Workers were ill and unable to report to work; some were simply afraid of becoming infected themselves, so they just stayed home. In some cases, local officials directed that theaters, schools, stores, and other public places be closed in an attempt to prevent the spread of disease to others within the community. This resulted in huge economic losses. It was not uncommon for entire families to perish during the outbreak. Many small businesses never reopened because there was no one left to manage the business. Routine services such as utilities and ice and food deliveries often stopped for days as trained workers became ill and could not report for work or died. Meetings such as church services, community events, and fairs were canceled because of the outbreak. Schools and universities canceled classes because students and faculty either could not report for classes or refused to attend for fear of contracting the flu. Hospitals quickly became overwhelmed with patients and had to turn them away. Tent hospitals were established in order to treat the most severe patients. In rural areas where many could not afford medical care, they simply treated family members as best they could and hoped for the best. Funeral homes become so overwhelmed they had to hold multiple funerals each day just to keep up.

Preparedness Efforts

The World Health Organization (WHO) joined forces with the Centers for Disease Control and Prevention (CDC), the International Society for Disease Surveillance (ISDS), and private health organizations to develop syndromic surveillance standards and guidelines. Several outbreak indicators have been developed using these standards and guidelines. These indicators include but are not limited to monitoring individuals for fevers, dysphasia, respiratory problems, skin lesions, and other associated medical problems. Once the medical signs and symptoms associated with a possible outbreak are recognized, medical and scientific teams examine these sick individuals and then confirm their illness using laboratory tests. Government agencies and public health officials in the affected area then notify their counterparts throughout the world in an effort to identify similar outbreaks. At this point, public health officials may officially designate the outbreak as an epidemic. However, epidemics can easily become pandemics once the outbreak affects larger regions or other areas of the world. Because the historical epicenters of the largest disease outbreaks have occurred in southeast Asia, the WHO and its partners have focused much of their attention on this region of the world.

Response

Upon recognition and confirmation of a disease outbreak, public health officials attempt to vaccinate the affected community in an effort to prevent the outbreak from spreading. Moreover, officials may initiate efforts such as social distancing, school closures, and encouragement of work-from-home strategies. Crisis managers may work with private-sector partners to initiate specialized services such as call-ahead shopping and curbside pickup. Neighboring communities, villages, and towns are monitored for similar illnesses, and treatment is provided as needed. Public health and government officials may monitor travelers for the signs and symptoms of the outbreak. These efforts may include using thermal imaging cameras to detect high fevers or simply observing passengers for coughing, runny noses, or signs of malaise. Travelers displaying these signs or symptoms may be detained and quarantined as means of reducing exposure to others. Travel restrictions may be put into place in order to contain the outbreak. Public health officials also notify key stakeholders and other health officials in an effort to identify additional outbreaks. These regionalized and cross-border partnerships among world organizations, governments, and public health officials have led to the reduction and prevention of outbreaks in other countries. During the 2009–10 H1N1/H5N1 outbreak, public health leaders in both Asia and Mexico notified World Health Organization officials whenever they detected a new emerging potential disease outbreak. This early warning system allowed physicians, crisis managers, government leaders, and scientists to develop a response before the outbreak became a pandemic.

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See Also: Centers for Disease Control and Prevention (CDC); Cholera; Crisis, Definition of; Doctors Without Borders; Ebola Virus; HIV/AIDS Epidemic; Infectious Disease; Infestations, Parasite; Influenza; Pandemics; Poverty; Public Health Surveillance; Refugee and Forced Migration; Response; Risk Treatment; Severe Acute Respiratory Syndrome (SARS); Smallpox; Tuberculosis; Uncertainty; Vaccinations; World Health Organization (WHO), UN.

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Ethnic Cleansing

Although instances of ethnic cleansing since World War II, and especially during the last five decades of the 20th century, have often figured prominently in newspapers and journalistic accounts, including infamous cases such as Rwanda, Bosnia, Darfur, and the Indian partition, it remains a controversial subject. In each case, a dominant, well-armed group can inflict devastating harm, expulsion, relocation, and mass murder in an effort to eliminate the presence of a suspect targeted group from a territorial area as part of an overall political campaign to "purify" the land in dispute. The central issue has been sharply defined during those years by international agreements and efforts by the United Nations to define what ethnic cleansing really is.

Based on a wide variety of conventional definitions, ethnic cleansing is most often understood to mean the following:

- The systematic elimination of an ethnic group or groups from a region or society, as by deportation, forced emigration, or genocide
- A mixture of forced emigration and population exchange with elements of territorial deportation and targeted killing
- The physical and political expulsion of an "undesirable" population from a given territory because of religious or ethnic discrimination; political, strategic, or ideological considerations; or a combination of these factors

A more formal definition arose in the 1948 Convention for the Prevention and the Punishment of the Crime of Genocide. That convention said genocide was any of the following acts committed with intent to destroy, in whole or in part, a national, ethnic, racial, or religious group, as by (1) killing members of the group, (2) causing serious bodily or mental harm to members of the group, (3) deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part, (4) imposing measures intended to prevent births within the group, and (5) forcibly transferring children of the group to another group.

It is important to note that ethnic cleansing often includes indiscriminate killing of targeted ethnic, racial, cultural, or religious groups, but such activity by itself does not necessarily elevate it to the formal legal definition of genocide. This is an irritant both to the victims of ethnic cleansing and to those seeking to punish and indict those leaders who are responsible for directing or authorizing ethnic cleansing.

The strongest efforts have been aimed at punishing those who are responsible for genocide, primarily through individual criminal tribunals organized for that specific purpose. Even these endeavors—in Rwanda and the former Yugoslavia—have come about only in this decade. Those responsible for recognized acts of genocide over the last three decades have gone unpunished, despite demands from survivors and witnesses.

The United Nations Commission of Experts' report on ethnic cleansing in Bosnia issued in 1994 described ethnic cleansing as "the planned deliberate removal from a specific territory, persons of a particular ethnic group by external force or intimidation, in order to render that area ethnically homogenous," which it based on "the many reports describing the policy and practices conducted in the former Yugoslavia." The commission went on to state that, "ethnic cleansing has been carried out by means of murder, torture, arbitrary arrest and detention, extra-judicial executions, rape and sexual assaults, confinement of civilian population in ghetto areas, forcible removal, displacement and deportation of civilian population, deliberate military attacks or threats of attacks on civilians and civilian areas, and wanton destruction of property. Those practices constitute crimes against humanity and can be assimilated to specific war crimes. Furthermore, such acts could ultimately also fall within the meaning of the 1948 Genocide Convention."

The UN Commission of Experts (established pursuant to UN Security Council Resolution 780) held that the practices associated with ethnic cleansing "constitute crimes against humanity and can be assimilated to specific war crimes. Furthermore ... such acts could also fall within the meaning of the Genocide Convention." The UN General Assembly condemned "ethnic cleansing" and racial hatred in a 1992 resolution, saying it is similar to forced deportation or "population transfer" whereas genocide is the "intentional murder of part or all of a particular ethnic, religious, or national group." The central idea in ethnic cleansing is "to get people to move, and the means used to this end range from the legal to the semi-legal."

The 1994 UN special experts' report on Bosnia referred to "the abhorrent policy of 'ethnic cleansing,' which is a form of genocide," as being carried on in Bosnia and Herzegovina. This was the specific campaign by Serbs against Bosniak Muslims. The report went on to say that ethnic cleansing can only be a form of genocide within the meaning of the 1948 Convention, if it corresponds to or falls within one of the categories of acts prohibited by Article II of the Convention:

> Neither the intent, as a matter of policy, to render an area 'ethnically homogeneous,' nor the operations that may be carried out to implement such policy, can as such be designated as genocide: the intent that characterizes genocide is 'to destroy, in whole or in part' a particular group, and deportation or displacement of the members of a group, even if effected by force, is not necessarily equivalent to destruction of that group, nor is such destruction an automatic consequence of the displacement. This is not to say that acts described as 'ethnic cleansing' may never constitute genocide, if they are such as to be characterized as, for example, 'deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part,' contrary to Article II, paragraph (c), of the Convention, provided such action is carried out with the necessary specific intent … that is to say with a view to the destruction of the group.

Strictly speaking, there is no formal legal definition of ethnic cleansing yet agreed to by an international body. However, ethnic cleansing in the broad sense—the forcible deportation of a population—is defined by UN agencies as a crime against humanity under the statutes of both the International Criminal Court (ICC) and the International Criminal Tribunal for the Former Yugoslavia. Holding those accountable for directing and authorizing ethnic cleansing has met with limited success.

Historically, instances of ethnic cleansing can be found going back centuries, to at least 700 B.C.E. by various kingdoms, leaders, and conquering groups in biblical times. Most well-recorded instances seem to start significantly after 700 C.E. and move forward, as a mix of historical accounts take note of this practice without benefit of an agreed definition. For example, while many would find this instance at variance with our definition, some could argue that within two centuries following the birth of Islam, there was an aggressive and wide-ranging campaign of conquest and systematic elimination of native males to compel their widows to revert to Islam. Forced conversion by the sword, which arguably imposed ruthless and totalitarian requirements on conquered populations, typically made its victims choose between Islam and death. In a matter of 200 years, Iraq, Syria, Palestine, Egypt, and most of what is now the north African Levant, which had historically been non-Arab, became Arab-speaking Muslim societies.

There is ample evidence of Jews being expelled from England (1290), France (1306), Hungary (1349–60), Provence (1394 and 1490), Austria (1421), Lithuania (1445), Cracow (1494), Portugal (1497), and numerous German principalities at various times. More recently, during the 20th century, other instances of ethnic cleansing noted in history include the following:

- The controversy surrounding Turkish efforts to exterminate Armenians in 1915
- Japanese imperial military extermination and destruction of native Chinese populations in Harbin during the late 1930s
- Croatian plans to purge Croatia of Serbs during World War II by killing one-third, expelling one-third, and assimilating the rest
- An Indian military campaign in 1947 that caused 6 million Muslims to flee risks of genocide, relocating to what became Pakistan and, in turn out of fear of retribution, 5 million Hindus and Sikhs fleeing what became Pakistan into India

In 2012, as the infamous Arab Spring unfolded in Tunisia, Libya, and Egypt, there were some reported instances of ethnic cleansing similar to the kind being waged against dark-skinned peoples in Darfur Sudan. In a June 21 *Wall Street Journal* article covering the dissolution of Muammar Gaddafi's Libya, reporter Sam Dagher described Tawergha as a town inhabited mostly by black Libyans, a legacy of its 19th-century origins as a transit town in the slave trade. He related the comments one of the rebel commanders from the rebel Misrata brigade as follows:

> Ibrahim al-Halbous, a rebel commander leading the fight near Tawergha, says all remaining residents should leave [at] once if his fighters capture the town. "They should pack up," Mr. Halbous said. "Tawergha no longer exists, only Misrata."

Here again, the trail of evidence regarding ethnic cleansing is more anecdotal than factual but nevertheless illustrates the continuing dilemma of anyone who would allege that ethnic cleansing is actually taking place. The lesson of history is that brutal and bloody civil wars, humanitarian crises, and guerrilla campaigns for decades to come in the 21st century may include instances of ethnic cleansing whether they are reported or not. History exemplifies this violent trend that reflects a tendency to use this form of lethal leverage as part of a calculated political effort to permanently alter the landscape, history, and culture of an area.

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See Also: Civil War; Failed States; Famine; Foreign Policy Crises; Human Trafficking; Immigration; Interstate War; Land Mines; Refugees and Forced Migration; Terrorism; Vulnerable Populations; War Crimes.

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Evacuation

Evacuation means to move from a place of danger to a place that is safe. It is conceptualized in multiple ways within the literature. Ideally, evacuation should involve using the quickest path to safety. Evacuations are more common than the public realizes. Each year, issues such as chemical releases, wildfires, floods, and even snowstorms force the public to evacuate their homes. Moreover, in a heat wave, often vulnerable populations are moved from their homes to "cooling stations" with the goal of protecting them from brownouts or air conditioner malfunctions, simply to ensure that they are not adversely affected by the extreme temperatures.

Evacuations can be either short term or long term. Short-term evacuations require leaving for safety for a short period of time, to enough distance from danger. In the event of such an occurrence, directions from local emergency management officials are provided. Long-term evacuations may cause individuals to experience displacement or the inability to return to their homes or communities.

Community or individual planning for evacuation has become an integral part of crisis and crisis preparedness. Described as crisis relocation, temporary displacement, or evacuation, much planning for possible evacuation in future nuclear wartime situations has been undertaken in addition to planning for natural and human-made disasters. Planning in the literature is sometimes confounded with preparedness and other times treated as its own construct. Preparedness in the form of general knowledge and information should facilitate evacuation by enabling more appropriate response behaviors. It essentially refers to the readiness of a political jurisdiction to react to threats from the environment in a way that reduces the negative consequences of impact to the health and safety of at-risk individuals. Therefore, preparedness should be treated as distinct from evacuation planning. Planning and preparedness are similar in their attempt to reduce harm and the ability of both to be undertaken at the individual or group level.

The importance of evacuation appears obvious, given that its advantages are seldom explicitly discussed or enumerated in crisis and disaster research. It is an obvious pre-crisis strategy for mitigating the negative consequences associated with a particular extreme event. Pre-crisis evacuation may also serve to strengthen morale because it has the ability to reinforce the beliefs of citizens that authorities are looking out for their interests during a crisis. Post-impact evacuation may enable victims to more easily obtain necessities such as food, water, medication, and shelter.

When community evacuation becomes necessary, it is common for the order to come from local officials. Moreover, the order to evacuate is usually accompanied by detailed instructions. These instructions are updated and repeated by the mass media. In some crises, other warning methods, such as sirens or telephone calls (including what is known as reverse 911) or text messages, are also used. Agencies at several levels of government offer literature and recommendations for evacuation planning. Some of the most common recommendations in the United States include advice such as keeping adequate gas in a primary vehicle for an evacuation. Support is given for this procedure because gas stations may be closed during an emergency or it may be impossible for gas stations to distribute gas during a power outage.

If an individual does not own a car, he/she is encouraged to make arrangements to facilitate evacuation. Additionally, people are encouraged to have a disaster supply kit for the event of an evacuation, sometimes referred to as a bug-out-bag, 72-hour kit, or grab-bag. Recommendations for the contents of a kit include three days of food, water, and clothing. Batteries, radio, first aid supplies, tools, medications, currency, and needed documents are also suggested components.

Evacuation Training and Preparation

Training and planning for evacuations is generally recognized as one of the most important elements to an effective evacuation and response. Effective evacuations do not rely only on the knowledge and application of technical expertise or emergency operation procedures and logistics; they also rely on the nontechnical personnel involved in maintaining communication systems, directions, and structures. Finally, successful evacuations depend upon a well-informed citizenry. Evacuation planning is often limited and of poor quality. Training and preparation are generally required to improve skills for an evacuation. Skills needed for a successful evacuation include decision making, communication, leadership, and coordination. Training results in more effective and efficient decision making, accelerated proficiency, and the development of expertise in individuals and teams, all of which are issues particularly crucial in complex, highly uncertain, critical, and hazardous real-life situations.

Training and evacuation preparation tend to take the form of exercises, drills, informational seminars, and public service announcements. Such events are usually sponsored by local emergency response teams or regional coordinating units. Involvement of local radio stations can provide benefits to the community and is useful to radio station personnel in understanding community response. Moreover, without training, innovation and emergent organization in response to a crisis are less likely to occur. Exercises and drills also allow participants to gauge how personnel and equipment will work in a specific environment.

The public generally makes risk assessments and decisions to evacuate based on sensory perception. Thus, one advantage of training and preparation is when the general public is taken off guard or underestimated the risk—even if they begin evacuation, their chance of success is strong.

For some crises that require evacuation, the risks associated are typically visible and relatively well understood, such as natural disasters. Events such as terrorism are typically less understood, causing individuals to question whether to evacuate or shelter-in-place.

Evacuation Coordination and Crisis

The issue of interorganizational coordination is also associated with the success or failure of an evacuation. Coordination is based largely on precrisis understanding facilitated by planning and training. In other words, activities such as exercises can aid in multi-organizational coordination. In a large-scale crisis, coordination of communication and emergency response is required because the capacity of individual emergency response agencies is limited. Moreover, unanticipated problems may arise, making response even more difficult; thus, coordination among several emergency response agencies is often necessary to manage the evacuation.

Researchers have suggested that the media play an important role in evacuation coordination. First, responders define and portray an event as a crisis by using their perspectives and experiences. Media frames are created by journalists and reporters, and these influence subsequent interpretations of the crisis. Moreover, first responders and managers of first responders rely on media coverage for information in order to make decisions about response strategies, logistics, and operations in the event of an evacuation. They also depend on the media to inform the larger public about the evacuation and changes in procedures and conditions. During the actual evacuation, radio may be the only broadcast medium individuals can receive.

Radio stations are expected to aid in the communication and coordination needs of a community during a crisis and at times even go above this expectation. In their mission to serve the public need, local stations will often replace regular programming with continuous live coverage of a crisis. Such coverage is likely to include accounts from listeners, reports from affected areas, instructions, and statements from public officials. Radio can also be used as a mechanism for proactively recruiting of volunteers to help in evacuations and for reactively assisting in disaster logistics and relief activities.

For example, in 1994, Louisville, Kentucky, was hit with record snowfall that shut the city down for almost a week. WHAS 840-AM radio made an effort to coordinate local response efforts, such as mobilizing individuals with 4×4 vehicles. Another instance occurred when WHAS broadcast a story about a local 3-year-old girl in need of a liver transplant. A donor was found in Omaha, Nebraska, but the streets of Louisville were covered with 16 inches of snow and the local airport was closed. After WHAS broadcast the story, over 200 people arrived with snow shovels to clear a helicopter landing spot in a church parking lot near the home of the young girl. Also, shortly after the broadcast, volunteers arrived to plow the local runway so the helicopter could land safely at the hospital. On a day when most folks could not get down the block, the young girl got to Omaha in time. Radio was a needed and effective medium for coordinating the evacuation of one person during the storm.

Organizations almost always rely on extensive relationships and networks of external groups and agencies during an evacuation. The issue of evacuation coordination is complex, and organizations and agencies face many impediments to effectively working together during the stress and uncertainty of a crisis. Lack of coordination during an evacuation may be attributed to factors such as misunderstandings among organizations, failure to fully utilize equipment and personnel, omission of essential tasks, and overly taxed organizations. The novelty of crises and other extreme events also makes coordination necessary but challenging. It has been noted that organizations with experience working together before a crisis experience fewer problems during crises. Thus, organizations working together in evacuation training or exercises may be better prepared to improve disaster coordination. Increasingly important to the successful management of disasters are emergent multiorganizational networks, or EMONs. EMONs comprise personnel and resources drawn from governmental, quasi-governmental, and private organizations. EMONs must deal with unfamiliar personnel, communication breakdowns, and ambiguity in the emergent authority structure.

An injured woman tries to calm herself just before takeoff during a U.S. Navy medical evacuation in the aftermath of Hurricane Felix in Nicaragua, September 7, 2007.

Evacuating Individuals With Special Needs

The National Fire Protection Association (NFPA) classifies five general categories of disabilities to consider when making evacuation plans. These are mobility impairments, visual impairments, hearing impairments, speech impairments, and cognitive impairments. When making evacuation plans for these groups, questions to consider include how will they obtain the notification of evacuation, how will they find the evacuation route, and can they evacuate on their own or will they need assistance? Low-mobility groups, the elderly, and individuals with disabilities are some of many groups that are often left out of the evacuation planning process. Individuals in such groups may be unable to react quickly or to take proper protective actions to evacuate and therefore may be more likely to experience harm.

The Federal Emergency Management Agency (FEMA) has attempted to integrate its guidance to crisis managers on issues related to disability and other functional needs in the adoption of a new model called Functional Need Support Service (FNSS). This model works well with the housing of functional needs populations. Specifically, the model encourages stakeholder participation in the planning and implementation process. The best information available to assist crisis managers in developing crisis plans that accommodate functional needs can be found within the local community itself. Therefore, crisis planning that is more local is seen as more responsive to local needs.

In order to persuade people to engage in evacuation planning, individuals first must be convinced that evacuating will lead them to safety (response efficacy) and must believe that they can take the recommended action (self-efficacy). This is another barrier to planning for individuals with special needs. The self-efficacy problems of the elderly, therefore, revolve around reappraisals and misappraisals of their capabilities. Many physical capacities also decrease with age, requiring reappraisals of self-efficacy for activities in which the mediating biological functions have been significantly affected. Variability in self-efficacy is in part determined by whom the elderly compare themselves against. Those who measure their capabilities against people their age are less likely to view themselves as declining; however, when the elderly populations see evacuation behavior being modeled by only younger people, the motivation to engage in planning decreases. When individuals observe a model with similar characteristics performing a task successfully, this experience helps bolster their own self-efficacy.

Case Study: Evacuation During the 2003 E2 Nightclub Disaster in Chicago, Illinois

At the time of the crisis, Epitome restaurant was located at 2347 South Michigan Avenue in Chicago. On the second floor of the restaurant is the E2 nightclub. In the early morning hours of February, 17, 2003, a crowd of over 1,000 patrons was asphyxiated by mace that a security guard working for E2 nightclub had sprayed in attempts to break up an altercation. As the crowd began running toward the only exit available, hundreds of people were caught in a 6-foot-high human stampede. Twenty-one people lost their lives due to trampling.

A major factor that contributed to the stampede was the construction of the E2 nightclub. The E2 is located at the south entrance of the Epitome restaurant. However, there is only one main staircase leading up to the club. Between the staircase and the entrance to the club is a narrow corridor. Once inside the nightclub, there are additional staircases leading to VIP boxes, but the only way to exit the boxes is to enter the assembly area of E2. In other words, there is no stairway leading from the VIP boxes to the ground floor exit. Building inspections conducted six months prior to the tragedy had maintained an order not to occupy the E2 nightclub. However, this mandatory order did not deter E2's management from throwing events. Also, no occupancy placard was enforced for the nightclub because E2's operators informed the Department of Buildings that the nightclub was not open for business.

A significant number of complaints were also filed against E2 in the years prior to the stampede. Most of these were violations regarded building codes, liquor license violations, and serving to minors. Overall, 11 building code complaints were issued against the owners of E2 and Epitome restaurant—the most serious dealt with structural issues with roof trusses and the construction of VIP rooms on those trusses. After the complaints were brought to court on July 19, 2002, only one violation was granted, which resulted in a court order not to occupy the second floor. However, E2 management did not comply and continued to throw parties in the nightclub. Also, the Chicago Police Department was never notified of the order, even though it made frequent visits to the nightclub after the court order was enforced.

The Chicago liquor commission voiced unclear regulations that governed liquor licenses, which also contributed to the onset of the crisis. La Mirage Studio Ltd. d.b.a. Epitome E2 (the operating name for the Epitome restaurant and the E2 nightclub) needed two liquor licenses to sell alcohol in both locations. The liquor commission did not clearly indicate, however, that because E2 and Epitome were considered two separate facilities, they needed two separate liquor licenses. Also, the operators of La Mirage Studio did not request clarification as to the scale of the liquor license regulations. Therefore, E2 continued to serve liquor even though Epitome was the only facility displaying a liquor license. This persistent lack of responsibility of the operators of E2 and Chicago's agencies resulted in one of the worst tragedies Chicago has ever seen. Thus, lack of evacuation planning, evacuation routes, and knowledge, coupled with repeat system failures, created an easily preventable crisis.

Other Types of Evacuations

Communities are not the only level of analysis by which evacuations occur; planned evacuations exist for airplanes, boats, public venues, and buildings, often called small-scale evacuations. Evacuation procedures are covered on all commercial U.S. airline flights. Additionally, shelter-in-place, or horizontal evacuation, is also well represented in the literature. This type of evacuation is a short-term strategy for protection from a risk. The strategy is not new but did gain more public attention during discussion of the prospect of a "dirty bomb" or other related chemical, radiological, and biological emergencies. Shelter-in-place means selecting a small interior room with no or few windows and taking refuge there. Shelter-in-place can even be applied to individuals in a vehicle. In such a situation, individuals are instructed to turn off their automobile engine and close windows and vents. If possible, they should seal the vents with duct tape and listen to the radio regularly for emergency instructions.

After the first bombing of the World Trade Center in 1993, evacuation planning and practice efforts in the center increased. The building evacuation that took place in the World Trade Center on September 11, 2001, was for the most part considered successful. It was estimated that on the day of the attacks, the number of individuals in the towers was between 10,000 and 15,000. The success of the evacuation has in large part been attributed to the enhancements and evacuation drills that followed the 1993 World Trade Center bombing. These enhancements included increased evacuation drills, adding battery-powered lights and glow-in-the-dark paint in the stairwells, the appointment and training of floor marshals to facilitate the evacuation process, and redesigned emergency plans.

Crowd Safety and Survival

In the last century, there have been numerous accounts of human disasters resulting from unforeseen conditions such as building fires, trampling, stampeding, and suffocation. With no avenue of escape, humans experience extreme panic, which results in terrible injuries and death by human hands. Academic scholarship has shown that concert halls, sports arenas, assemblies, stadiums, and nightclubs are prone to accidents when overcrowding is part of the culture. Thus, managing large numbers of crowds has become an extremely complex endeavor. Crisis management literature has attempted to tackle these aforementioned problems by focusing on two parallel approaches to disaster management: contingency-based and strategic-based approaches to evacuations.

The contingency-based approach is concerned with reactive modes to dealing with crisis events, such as evacuations and/or media and medical responses. This approach is more technical in nature, focusing on nonhuman elements that may enhance safety in the case of mass evacuation. In large sports arenas, for example, crisis management consultants provide technical information such as passageway and corridor widths that can withstand large crowds of people. Also, providing businesses such as nightclubs with maximum capacity occupancy placards and proper liquor distribution can help ensure crowd safety. These scholars and practitioners are typically concerned with the cost and control aspects of crisis management. The strategic-based approach to disaster management examines crisis as a preventable activity, one that works to instill change in the organizing mind-set. This approach is more organic in nature and focuses on communications, cultural change, and reconfiguration. The assumption of this approach is that any taken-for-granted beliefs about the notions of safety and crowd control can and should be replaced with new and innovative strategies, thus ridding any technical or regulatory behavior. However, evacuations are not always planned or initiated by crowd safety control practitioners. As is evident in much scholarly and documented research, human stampeding is an inertia that forestalls any possible safety measures.

Human Stampedes

Public spaces bring a large and diverse number of people together. Whether it is a city block, a musical performance, or a parade, people gather in tight-knit spaces. Such diversity in crowds can be a rewarding and celebratory experience. People gather to bring in the New Year or to support a presidential candidate. However, crowds also gather to protest or express their own interests with anger and outrage. When considering the latter, evacuating can be a tricky and often dangerous experience. Individuals who gather in public spaces are often strangers with their own values, beliefs, and interests at heart. From a biological standpoint, these personal interests activate a survival response, often without concern for others. The reaction for one's own survival also supersedes any plans for evacuation safety. As a result, people experience high levels of anxiety, panic, and irrational behavior. When such panic ensues, individuals' attention to escape routes such as side exits is typically minimized. Numerous accounts of human stampedes can make these notions more concrete.

In 2000 alone, there were over 12 major crowd disasters documented in venues such as stadiums, nightclubs, holy places, and camps. Also, since the early 20th century, the United Kingdom has documented countless numbers of football stadium disasters. Each crowd gathering resulted in major injuries and even death of patrons. Tear gas, oversold stadiums, overexcited fans, and overcrowding were among the many instigators of evacuation disasters. Such panic situations result in the death of people who are trampled and crushed by other individuals. Panic stampedes are also documented as one of the most tragic collective behaviors. One particular human stampede that occurred in the United States is examined on page 384 for further clarification.

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See Also: Chaos Theory; Coordination; Crisis Simulations; Earthquakes; Emergency Alert Systems; Hazard Mitigation; High Reliability Organization Theory; Safety Policies; Training.

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Exercises

A crisis is recognized as an abnormal situation that is beyond the scope of everyday activities and that might threaten the operation, safety, and reputation of an organization. In order to prepare for, respond to, and recover from modern crises, organizations should establish both crisis management and business continuity plans. Once these plans have been written, exercises should be used to test the effectiveness of the entire cycle of the crisis and business continuity management processes. Exercises can be used to ensure that staff are aware of and understand the existence of plans and are familiar with the proposed arrangements. Exercises can be used to rehearse, test, revise, and improve the plans.

Definition

Exercises have been widely used in complex and diverse disciplines, for example, hunting and fighting skills, airplane performance simulations, and current classroom exercises for school students. Canada, Australia, and the United States tend to use drills, while European countries refer to them as simulations. Exercises can be defined as one of the training methods that represent a selected feature of a real and dynamic situation, replicating it within a risk-free environment within which trainees are placed to cope with particular challenges that improve learning outcomes.

The United Kingdom (UK) Cabinet Office describes an exercise as the simulation of an emergency that is used to "validate plans (validation);

to develop staff competencies and to give them practice in carrying out their roles in the plans (training); and to test well-established procedures (testing)." Ideally, those involved in the exercises should be trained beforehand. At the same time, the U.S. Federal Emergency Management Agency (FEMA) also defines an exercise as "an activity designed to promote preparations for emergency situations in order to test operations, policies, plans, procedures or equipment, or to demonstrate the capability to respond to a crisis." In any case, the aim of exercises is to use more frequent, constant, and broad variety types of training methods to improve and retain staff knowledge and skills that are related to preparing for and responding to accidental or crisis situations.

The UK Home Office categorizes exercises into four types: (1) discussion-based seminar and/or scenarios, (2) tabletop (multidiscipline, single-agency, and management-level role-play), (3) control post, and (4) live exercises (small-scale-single-agency to test one component or full-scale-multi-agency to test the whole response to an incident). The FEMA further divides exercises into drills, functions, and full-scale. There is also a trend to include information technology (IT)-based exercises in the discussion.

Skills to Be Trained During an Exercise

An exercise is a useful tool to provide repeated learning by individuals, teams, and organizations involved in a crisis event for how to prevent or deal with disruptive situations. Exercises also provide a platform for participants to develop a more detailed understanding of decision criteria, decision-making processes, organizational cultures, formal and informal communication structures, multiagency response mechanisms, and associated strategic issues. From a pedagogical perspective, exercises address adult learners' preference for active and experience-centered learning and opportunities for more inductive or guided-discovery learning approaches with flexibility for the incorporation of error-based learning that must be otherwise avoided in real crisis events. Training for crisis is unique in its need to simulate high levels of nonroutine, uncertain, and complex problem solving needing urgent action and intricate patterns of intra- and interagency decision making and communications.

Decision makers normally have two types of responsibilities: routine and nonroutine matters. During a normal situation, the exercise participants carry out their routine daily tasks; however, it is during abnormal situations that they will be expected to confront challenges problematically. During unexpected emergency events or abnormal situations, decision makers will be expected to confront many challenges, including (1) ill-structured problems; (2) uncertain dynamic environments; (3) shifting, ill-defined, or competing goals; (4) action/feedback loops; (5) time stress; (6) high stakes; (7) multiple players; and (8) organizational goals and norms. These problems prevent decision makers from communicating and disseminating decisions, and they create difficulties coordinating with other agencies. They require flexible, adaptive, and effective individuals and teams with the appropriate skills and attributes in order to provide a timely and coordinated response and to manage the wider impacts of the emergency. As a consequence, exercises normally focus on the development of these nonroutine skills.

Trend of Modern Crisis Exercises

As a result of the increasing frequency and magnitude of natural and human-made disasters, there has been increasing demand for modern large-scale crisis exercises to be held, aiming to train for multiagency communication and coordination skills. These exercises have three distinct characteristics: the involvement of more participants, blurred objectives, and vague ownership.

First, these large-scale exercises normally involve large numbers of participants. These participants are also normally drawn from different agencies and organizations. In the European Union (EU), there is a trend to conduct cross-boundary exercises where participants from several states are involved. For example, in 2008, Hungary hosted a cross-border emergency response exercise that included nine EU countries plus Croatia (EU-HUROMEX 2008) and highlighted the importance of communication and coordination between nations.

Second, because these participants are from different agencies, organizations and states, they each have their own exercise control posts or control and command centers. For example, the scenario of Flood Ex was set to be the equivalent of the

1953 tidal flood in the UK and the Netherlands. The exercise included field and control post simulations. The field exercise took place in several locations in Amstelmeer, the northern part of North Holland, while the control post exercise was based in the participants' crisis centers. The limitation of exercises of this type is that normally participants from different control posts are not able to meet each other during the exercise. This reduces the nature and complexity of a disastrous event, which is the key to training individual responses.

Third, as the exercise becomes so extensive, the ownership becomes vague. It is easy for a modern large-scale exercise to attract many relevant agencies to engage with, from local to national levels, and such an exercise could easily involve hundreds of participants. For example, the UK national flood exercise Triton 2004 involved about 1,000 participants from more than 60 different organizations, and more than 10,000 people took part in the exercise Watermark 2011. Although each participant unit/organization was provided with a generic scenario, they could create their objectives depending on their needs. What made the ownership become vague was that most of the agencies participated in the exercise at the last minute; each control post designed its own injects and conducted different types of exercises in accordance with its perceived requirements.

The Challenges of Crisis Exercises

It is widely recognized that the challenges of emergency response exercises include limited training time available and inadequate funds. They also require large numbers of personnel, for example, exercise planners, participants, observers, and training technologists. As a result, it is difficult to conduct frequent exercises. From a pedagogical perspective, several challenges when arranging crisis exercises can be summarized, including (1) fidelity and realism, (2) evaluation, (3) retention issues, (4) generalization issues, (5) progressive training, and (6) increasing flexibility.

Fidelity and Realism

Fidelity refers to the degree to which the scenario of the exercise represents the reality; in other words, it is the realism of the scenario. Fidelity examines the contents, processes, and context of an exercise. Content fidelity considers the degree to which the materials used in an exercise are equivalent to the reality. Process fidelity refers to the degree to which the operations and interactions correspond to real-world situations. Context fidelity indicates the degree to which the simulated scenario is similar to the reality.

There are controversies as to how much reality should be represented in an exercise to facilitate learning outcomes. Traditionally, it is believed that the higher the reality an exercise presents, the higher the learning that occurs. It is also argued that high psychological fidelity could increase learning outcomes, if it is not possible to establish context fidelity. However, recent scholars believe that a real-world scenario is not necessary for learning, as higher fidelity might reduce the skill acquisition for participants, in particular for those beginners in crisis response skills. Higher reality can be dangerous and stressful, and learners might be overstimulated. Consequently, it is suggested that low-fidelity exercises could facilitate learning nontechnical skills.

Evaluation

Because one of the challenges of current crisis exercises is to set up clear objectives, especially in strategic exercises where more abstract and complex tasks are involved, it is difficult to determine the internal validity—in other words, learning the outcomes or evaluation criteria—of an exercise. First, the roles and responsibilities of the organization involved in responding to a disaster could be varied because of the nature of the crisis; consequently, the missions and tasks that are assigned to an organization would be different. Second, crises are low-probability events and do not occur sufficiently frequently to generalize a set of measurements to evaluate the effectiveness of the practice. Lastly, although there are sets of evaluation methods for operational levels, it is difficult to determine the measurement of skills required at the strategic levels, such as coordination and communication.

Retention and Generalization Issues

To retain the knowledge and skills gained in an exercise until the next training or crisis occurs is another challenge. Because full-scale exercises are very expensive and involve many personnel, they do not happen frequently. Because the probability of a major incident taking place is comparatively low, not all skills learned in a training exercise session are likely to be used straightaway—some of them may never be needed.

The fourth challenge is to apply what has been learned from a scenario to different types of incidents or disasters. Exercises in emergency services are normally scenario based. However, these scenarios do not necessarily reflect what is happening in real life. How the individual generalizes the skills learned in the exercise and applies them to different scenarios and real-life situations is also a major challenge.

J. K. Ford and A. M. Schmidt propose that guided discovery learning, error-based learning, and metacognitive instruction can help build those adaptive capabilities that are required in an emergency response. Their proposal stresses the importance and usefulness of individual learning, but it ignores the element of multiagency coordination and communication.

Progressive Training

A training program for an individual should be planned and should be progressive. Professional experts normally use their existing knowledge to understand new skills. Based on this knowledge, they are expected to learn from simple to complex skills through a series of exercises. If exercises do not have a consistent training method or format, they do not have the characteristics for gradual progression.

Flexible Delivery Strategy

W. G. Green suggests that alternatives should be provided to increase flexibility in delivery strategies. First, he recommends that training taking place in an office environment or at home should be taken into consideration; hence, the use of the Internet can be a good option. Second, self-directed learning should be added onto exercises. Third, exercises should be conducted both by fixed schedule and for individuals to participate in their own time. By allowing participants to control their own learning, the skills gained from the exercises will last longer.

The Use of Virtual Worlds

Researchers have attempted to use different technological tools and applications to avoid the limitations of traditional crisis exercises and to increase the efficacy of learning activities while improving learning outcomes. These tools can be categorized as nonimmersive or immersive in character. Nonimmersive tools, for example, may include text-based Web tools, which create a simulated environment for participants to act in a safe and controlled scenario. Other tools include the use of computer modeling, interactive Web sites, and online discussion rooms to support decision making. These provide players with a real-time-based environment. Although this may not be as immersive as in 3D modeling of an environment, it can nonetheless allow players to exchange their feedback and reflections. In contrast, immersive computer-based simulations could represent complex workplace dynamics. They also represent the complex psychological, social, and political factors in the multiple-agency communication and coordination areas. In order to evaluate the players' performance, strictly controlled environments are normally used in these computer-based training exercises, which might limit the degree to which true fidelity can be demonstrated in the simulations.

More recently, new virtual world and games technologies allow for greater immersion within 3D environments via avatars that represent the individual in the 3D environment. This is opening up the potential for training exercises and scenarios that can be enacted with distributed learner groups, with scope for more dynamic scenario editing and therefore greater potential for creating dynamic and interactive virtual exercises.

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See Also: BS 25999; Business Continuity Planning; Crisis Simulations; Disaster Drills; Training.

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Failed States

The identification of a nation as a failed state centers on that state's inability to provide citizens with a safe and effective environment as well as its inability to operate within the international community. Social, economic, and political factors shape the determination of a nation as a failed state. Failed states are also generally unable to provide effective internal crisis management and often are the recipients of international crisis management as well as economic development aid. International aid that operates in support of a failed state's central government helps strengthen internal crisis management development as well as economic, political, and social development in both the short and long terms.

Although the term *failed state* has no mutually agreed upon definition, the definition developed by the think tank Fund for Peace is the most widely accepted among the international community. Since 2005, the Fund for Peace has coordinated with the magazine *Foreign Policy* to publish an annual Failed States Index, ranking the world's failed and vulnerable states based on its calculation of social, economic, and political criteria. Critics of the generally accepted categorization of failed states argue that its basis lies in a failed state's comparison to mostly Western developed countries as well as the label's negative connotations.

Failed States and Crisis Management

A combination of factors rather than a single factor leads to the determination of whether a nation is considered a failed state. These factors are based on analysis of either a state's resources or the functionality of its central government and associated state institutions. The factors considered as components of a failed state are often either conditions that can lead to crisis or crisis conditions in themselves. There is also a strong correlation between the factors that cause states to fail and the factors that lead to poor crisis management planning and response, leaving citizens of failed states vulnerable to crises and their short- and long-term impacts.

Social factors commonly found in failed states include demographic pressures such as high population densities, a lack of sufficient resources to provide for the population, and widespread or long-standing conflicts among ethnic, religious, or other groups. Social injustice or repression is also commonly present. Results can include high crime rates, high infant mortality rates, reduced educational access and attainment, poor health care, and reduced life spans. Long-term human flight and notable expatriate communities may result as those with the means to immigrate leave the country for better opportunities elsewhere. Those left behind are rendered more vulnerable to crisis.

Economic conditions commonly found in failed states are characterized by uneven economic development resulting in large gaps between economic, racial, or ethnic groups in areas such as employment and class status. Steep sudden or long-term economic decline may precipitate economic crises that further weaken central government, or the central government may be plagued by corruption fueled by resource abundance. Black markets or hidden economies based on illegal activities such as drug or diamond smuggling, human trafficking, or counterfeit goods may thrive. The economy is also particularly vulnerable to global economic crises.

Common political characteristics of failed states include lack of legitimate government, ineffective state institutions, lack of government transparency or accountability, widespread government corruption, and lack of or severely limited national participation within the international community. Symptoms of political dysfunction are unwieldy government bureaucracy; lack of or uneven legal enforcement; widespread loss of public confidence in government; loss of territorial control; military intervention within the political arena; widespread human and other rights violations; the institutionalized disenfranchisement of racial, ethnic, religious, or other groups; the distribution of political benefits to the elite; and lack of or poor public services.

The social, economic, and political characteristics of failed states often create or exacerbate crisis situations and increase the vulnerability of their populations to crisis impacts from natural or technological disasters, environmental hazards, or conflicts. The formation of large populations of refugees and displaced people, refugee camps with untenable living conditions, conflicts over scarce or unequally allocated resources or infrastructure, famine, disease pandemics, international or national border and land ownership conflicts, and genocide are crises commonly engendered within failed states.

The characteristics of failed states also contribute significantly to these states' inability to effectively develop crisis management plans and to effectively respond to the crises themselves through the relief, recovery, and rebuilding phases. Failed states are often unable to provide effective strategic crisis management planning or response, resulting in the involvement of the international aid community.

International Aid

Failed states are often the targets of international concern and aid mobilization, with an emphasis on the alleviation of poverty and other sources of distress, restoration of sustainable order and peace, and economic revival or development. The international community also becomes involved because of the potential international repercussions of crises within failed states. A lack of clear, centralized objectives and strategies; a lack of effective aid allocation; and neglect of the need to construct and actively involve state and local government organizations can plague international crisis aid.

Effectively rebuilding failed states and managing crises within them requires long-term international assistance in terms of both resources and personnel. Traditionally, more long-term international development aid has been directed toward developing nations with stronger central governments that will effectively manage such aid and help ensure that it reaches its intended target populations. Failed states have historically received more short-term aid in response to highly publicized large-scale crises such as terrorist attacks, refugee crises, massacres, or natural disasters. This aid then drops off precipitously once the immediate crisis has passed from the news.

Leading international agencies involved in crisis management include the United Nations, the World Bank, and the International Red Cross. A variety of local, national, and international government agencies and nongovernmental organizations (NGOs) are also involved. The United Nations Millennium Development Goals and the Paris 2005 and Accra 2008 conferences are key international agreements pertaining to international aid effectiveness. Poverty reduction and economic development are the centerpieces of these agreements. Common forms of international crisis management aid are the cancellation of outstanding national debts; the provision of emergency relief supplies, personnel, or technical equipment; and crisis management planning and recovery assistance.

Lack of an effective central government and the presence of multiple crisis relief and recovery organizations often results in numerous difficulties that plague international aid management. The absence of centralized management oversight, effective leadership, or intergovernmental or agency coordination, coupled with the presence of multiple administrations, is one of the most critical of these problems. The international aid community lacks a single administration responsible for establishing central objectives and coordinating and providing oversight for aid efforts. International crisis management efforts can also be hampered by inadequate training or shortages of qualified personnel, high turnover rates, lack of sufficient local knowledge, environmental safety or personal security issues, and waning long-term commitment of donors and resources.

Often, aid organizations establish their own political administrations that operate in addition to existing or developing state institutions. A provisional administration sanctioned by the United Nations or other international relief agency may also be present. When international aid organizations operate independently from, rather than in support of, state administrations, those state administrations can be further weakened and less able to respond effectively to present and future crises. New state governments determined by internationally observed democratic general elections do not always result in the effective state government control and resolution of conflict needed for effective crisis management. Local militias, mafias, guerrilla movements, or other armed groups often arise in the face of a weak or failed central government. Unequal and inconsistent resource allocation, poorly managed and inconsistent relief efforts, and relief and recovery efforts that do not align with the most urgent national needs can also result, especially within the short term.

One of the first goals is the assurance of the safety of the failed state's population. Although the intervention of foreign forces often provides short-term governmental agency and security forces, the development of effective long-term local and state government mechanisms and national security forces is vital for long-term security. A failure to develop local institutional capacities can threaten long-term future stability and sustainability. Long-term state governance and national security will aid the development of future local- and state-level crisis management planning as well as crisis mitigation and response.

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See Also: Brain Drain; Foreign Policy Crises; Peacekeeping; Vulnerability; Vulnerable Populations.

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Failover

During times of a realized crisis, business operations may find themselves in a position where they must execute a failover scenario. At that time, a failover can occur from a technical standpoint, meaning systems, certain servers, or complete data centers need to move to a secondary or backup setup, or from a geographical and/or personnel standpoint, meaning operations must be moved to an alternate local or international location, depending on the circumstances of the crisis, availability of critical operations personnel, and its level of severity. Many business leaders today view failover plans as a critical component for the future viability of a business not only to continue key operations but also to sustain themselves after the incident is over and the recovery stage begins. It is unfortunate that many businesses have ceased to exist for no other reason than they did not form robust failover plans for their information technology (IT) infrastructure, nor for their personnel and physical locations, and a real crisis did come their way with no way to recover from it.

Failover From a Technical Perspective

For many businesses and government agencies today, a complete system failure is considered a high-impact disaster, so IT departments or contracted partners are turning to solid preparations and updated technology to ensure that during times of crisis, systems appear to continue to be operational, even if there are immediate failures in a data center environment.

Traditionally, a computer server breakdown used to mean widespread panic and a scramble to find backup tapes and a spare server to restore information. Inevitably, this meant the operations of the business would be interrupted, people would become frustrated over not having access, and even a loss of data could occur. Recovering from a backup could take hours; even planned maintenance can take the server down during business hours, leaving teams unable to work. But with more advanced technology available, moving from one system to another has become reasonably automatic, and in cases where an entire data center failure occurs, a redundant data center is ready to ensure that interruptions are very minimal in nature or not even detectable to the average system user at an organization.

Some ways of providing technical failover are either with a fault-tolerant machine with duplicate hardware or with a high-availability (HA) architecture. The duplicate hardware in a redundant architecture works as a "copy" of the main system, so in the event that the main system does fail, the redundant machine takes over and becomes primary until repairs are made to the primary server. Some larger corporations, or ones that host extremely sensitive data, have sought additional layers of security and assurance that a system failure will not stop operational capability, and this is where the HA architecture comes into play. HA works by linking several machines together so that the failure of one computer brings another online—the users see no difference. The applications run on the servers, but the data are stored on the network, thus adding more protection to the environment. When any single server fails, users are redirected to other servers while the failed server is repaired or replaced and brought back online. In any event, a technical failover, from single system failure to complete data center shutdowns, can take place with minimal impact.

Physical Site Failover and Personnel Elements

The most common viewpoint of a failover is from a technical perspective, with servers, networks, phone systems, and data centers. But there are additional nontechnical elements in regard to the availability of a physical site or workplace, as well as in the event of suddenly having a severely reduced staff, or no staff at all, to continue operational capability at that workplace. Site and personnel failover strategies and responses come in many shapes and forms, and they all depend on whether the crisis is isolated to a single site or multiple sites in a campus environment, or if the crisis is a regional one widespread across an area that affects multiple businesses and/or government operations, and also reverberates a negative effect on personal life safety at home.

Site failover can consist of several options, with plans in place for an alternate worksite location(s) so that the operation has a single or multiple set of locations that meet the requirements to continue working in the event that the main location is no longer accessible. Other site failover strategies can include a mobile worksite, which is a specialized set of custom-designed mobile trailers equipped with all of the necessary infrastructure, such as workstations, kitchen facilities, restrooms, printers, faxes, Internet access, and other office-related supplies. In all cases, certain considerations must be made with respect to physical security mechanisms, heating and cooling, adequate power supply, personal needs of the staff, and access to pertinent information and documents.

Sometimes a regional disaster, such as a flood, hurricane, pandemic, or earthquake, can affect an area to the point where alternate work locations are not a viable solution, and the staff is affected in a way that they are not available to report for work. In this instance, a site and personnel failover can take place. Some companies and government agencies have available secondary workforce capabilities located in different regions nationally, or internationally, where a trained workforce can address critical-only functions as additional workload until such time when the regular workforce can return and the functions can then be failed back. This takes careful planning to ensure proper system access, function knowledge via cross-training of personnel, and identifying which functions are critical and must continue.

Failover Activation Considerations

As plans are put in place to have a significantly strong failover capability, one must consider how to activate that capability, at what level it is to be activated and the overall process of invoking a failover strategy. There is a very fine line that must be drawn with respect to the timing of invoking a failover at the right time, or there could be impacts to the business or government operation if the failover is invoked too slowly or beyond its proper threshold. A premature activation of a site or personnel failover can be very costly, bring confusion and potential panic internally, create undue media exposure, and affect overall reputation and professionalism as viewed by the public eye.

Technical failover, on the other hand, is a fairly black-and-white scenario, especially since modern technology causes a server failover to invoke the process to the available other servers automatically and notifies IT teams via system messaging or network device monitoring alarms. But when a complete data center needs to fail over to a secondary, backup, or disaster recovery center, this does require careful planning and execution to ensure minimal data loss and downtime, and that the secondary data center has all capabilities up and running in a timely manner. IT departments today dedicate a tremendous amount of time to this area, and most exercise their capability on an annual basis to ensure staff and capability readiness.

From a cost perspective, site and personnel failovers are expensive in nature, mostly due to the cost of logistics that stem from moving a complete business or government operation from one facility to another in a very short period of time, sometimes as quickly as within a single business day, depending on how critical the functions are to the public or the overall financial impact of having the business operation halted for a period of time. Investments today in the overall planning, available physical site and technical infrastructure, cross-training of personnel, and testing of all capabilities range broadly in the private business and government sectors, with careful considerations made to balance the efforts and costs of readiness.

Plans for Strengthening Business Resiliency

There is much discussion today in regard to failover and how that relates to a more resilient business or government operation. Failover, though one of many aspects of overall resiliency, is considered a key element in the assurance that a business or government agency can continue functioning during and after a crisis, and many business continuity and emergency managers are striving to integrate failover processes into the overall readiness strategy as one of their main goals.

To accomplish this goal, many companies and government agencies are developing all-encompassing, cross-functional programs to maintain continuous business operations and access to critical business data, while managing and predicting costs to achieve and maintain a highly ready state. The ability to blend solutions to accommodate the most critical business processes and applications during a failover scenario is a trademark of a resilient company.

Because business strategy is the formed roadmap for achieving its goals, failover strategy must also be integrated into the overall business culture to ensure that it works in harmony with the goals of the business and not be intrusive, but rather be viewed as productive. One of the main targets of failover planning is that it is such a strong part of overall preparedness that the actions within it are systematic, rather than impulsive or even frantic. As with any strategy, it must be under a form of governance to be monitored, enforced, and reviewed on a regular basis.

Three best practice points will differentiate a good failover plan to a resilient culture-driven operation: exercise and test, awareness and education, and communications. All technical and business mitigation solutions must be validated and tested. Exercise strategy helps protect the organization's investment because without periodic exercising, the effectiveness of the plan can quickly erode. Plans should be exercised regularly, commensurate with their importance to the company, and at least annually. Different types of exercises can be employed to ensure all facets of the plan and the solution are validated with respect to system and site failover. These can include tabletop or walk-through discussions for plan execution, or simulation through active participation to enable the process or technology external to the production environment, including full failover by switching from the production environment and operating from an alternate site.

Education and training of personnel in special, critical, and multiple roles plays a significant part in the success of the failover plan execution and may influence the time required to execute tasks. An awareness and education strategy helps ensure all employees are aware of the plan in general, not just those who participate in a failover regularly. Pandemic preparedness is a good example of using awareness programs to educate personnel on simple techniques to maintain their health and the health of their family members to mitigate the risk of high employee absenteeism predicted during a major flu outbreak, which would invoke the personnel failover plan.

Communicating during a crisis is probably the single most import aspect of a failover strategy. The key is maintaining current, accurate communication lists for both internal and external contacts, written scripts for internal and external communications, and company fact sheets, and ensuring employees are versed in public relations, legal response, and insurance. The communication plan should include contingencies for the loss or major degradation of standard access for both voice and data networks to ensure that messages are being received during a failover situation. Reliance on the Internet and intranets can be affected, so contingencies that include out-of-region service providers still prevail in some cases.

Having failover plans in place, exercising and testing them, and overall readiness through education and communication contribute greatly to the overall resilience strategy and can bring a sense of comfort, assurance, and strength in times of crisis.

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See Also: Alternate Site, Corporate; Backup Facility; Backup Media; Backup Strategy; Buildings; Business Continuity Management; Business Continuity Planning; Business Resumption Planning; Critical Applications; Critical Business Functions; Data Mirroring; Data Recovery; Disaster Recovery; Emergency Management, Principles of; Incident Management; Operational Plans; Resiliency; Risk Assessment; Sustainability.

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Famine

Crisis management of famine is best understood within a wider context than merely focusing on the final event called “famine.” An appreciation of this subject also requires some insight into decision-making processes and structures and interactions within a particular context such as region, nation, or locality. Indeed, studies have indicated that famine is often a product of multiple failures at various levels of governance or society. Indeed, doing justice to this discussion requires an exploration of a series of issues that lead to the point in time when catastrophic events descend into a crisis.

Are Famine Crises Unavoidable?

A large body of evidence has indicated that famine as a crisis principally results from poor policy, decision making, and planning. Interestingly, when famine strikes a region, the media portrayal of the crisis tends to be strikingly dramatic, as though the causes of a famine are entirely unforeseen. Because appeals for donations tend to be extremely urgent and often accompanied by heightened sensitivities, any appearance of critical and sometimes perfectly rational voices probing

In July 2011, 40-year-old Halima Bare attempts to find shade in Elado village in the Wajir District of northern Kenya, one of the regions hardest hit by ongoing drought. Halima walked 31 miles with her seven children to Elado after the drought killed most of their livestock. In Elado, they have one meal a day, which she shares with her children, taking the remnants. By July, 12 million people in east Africa—Somalia, Ethiopia, and Kenya—were struggling to find food or drink following the worst drought in 60 years.

questions into causation of the crisis are often silenced and dismissed. Yet there are facts about famine and crisis management that have been learned through history, research, and experience that justify such critical perspectives and can offer valuable reflection and lessons for the future.

Preparedness is an important aspect to effective crisis management in regard to famine. In the aftermath of satellite technologies and indeed following, for example, Landsat missions since the 1970s and others like them, there have been advances in the understanding of drought, for example, and famine in general. There has also been a marked increase in the type and quality of information and historical data that can be utilized as a baseline for planning within the management of crisis systems. Unfortunately, such invaluable information seems not to have been sufficiently utilized and harnessed for national strategic crisis and emergency management planning. Opportunities brought about by technological advances have, in a significant number of cases in the developing world, not been matched with corresponding national crisis management strategies and mechanisms. A good example to illustrate this lack of preparedness can be found in, for example, the case of Ethiopia where, despite the availability of historical crisis data and a pattern of recurring famines, the country is chronically underprepared for famine crisis management. Yet Ethiopia has, over at least two millennia, gathered a wealth of information relating to famine crisis. The story and history of Ethiopia is punctuated with droughts and famines. Thus, it would seem perfectly plausible to suggest that against this history, both locals and the government in Ethiopia would be familiar with the risks and vulnerabilities facing them. Indeed, during the intervening time between the 16th and the 20th centuries, two notorious famines or droughts struck Ethiopia, leading to the coining of the words *kifuken* and *kwachine* and these words being added to the Ethiopian vocabulary. The use of the two words conveys within the Ethiopian tradition a sense of extreme notoriety of the crisis.

Studies of droughts and famine crises have led to espousing particular approaches to farming and subsistence agriculture, in particular. Sporadic efforts by nongovernmental organizations (NGOs) and agencies have led to institutional learning whereby some farming practices are being advocated over others as alternatives for traditional ones. In parts of Ethiopia, for example, some subsistence farmers have traditionally kept large farm animals such as cattle. But as crisis becomes a recurrent event, there is a growing acceptance that land carrying capacity (the extent to which land can be exploited without adversely affecting it) for large animals is under extreme pressure during droughts, so new practices are emerging. Faced with dwindling animal feeds during droughts, subsistence farmers rearing shoats (smaller farm animals) will need comparatively smaller amounts of feed to manage than they would for larger animals.

Training as a Crisis Management Strategy

Training and resource development is another important aspect for managing a famine crisis. Understanding crisis alone is insufficient unless the right resources are made available at strategic, operational, and community levels to minimize the worst excesses of a crisis. Effective management for famine must entail engaging in a continual process of scanning the "horizon of the crisis-prone regions" and developing the knowledge and skills for dealing with potential and prevalent risks. Crisis in the context of famine is perhaps analogous to signs and symptoms of an underlying illness that too often only a trained crisis management team and community can assess, then take timely remedial action. Locals, particularly in famine crisis–prone areas, will normally or traditionally have some form of crisis coping mechanisms and strategies. However, when these traditional strategies and coping mechanisms are strained to their limit, they will show signs of tear and wear and general collapse by being ineffective in serving the people. A trained crisis manager, management team, government authority, and community can in many cases identify a point where the strain between traditional coping mechanisms gives way to famine. Prior to famine taking a foothold, affected people will go through stages of utilizing a range of personal resources they might have, including utilizing their social networks, selling some animals, selling nonessential items, and, in the later stages of the crisis selling essential items. When personal alternatives and resources are exhausted and possible safety nets are not readily available, the migration to seek other sources of livelihood, in urban areas for example, begins. Before this time, effective and trained crisis teams should have acted at multiple levels, supported by existing crisis management plans, monitoring of markets, coherent transport and health infrastructure, and the necessary technical know-how to monitor and evaluate the prevailing situation before it develops into an emergency.

Decision Making, Policy, and Famine

Poorly configured crisis management mechanisms—or lack of them—can adversely contribute toward the escalation of a famine crisis. Between 1845 and 1851, one of the worst famines in the history of Ireland claimed the lives of approximately 1.5 million people. The escalation of this crisis and subsequent famine has been attributed to the British colonial powers and indifference in designing effective and timely crisis plans and actions for dealing with the situation. Potato blight affected yields, which dwindled for three consecutive years in Ireland. Famine followed, and lack of food meant that people were extremely weak and unable to even accept some jobs that were eventually offered as alternative sources of livelihood for famine-affected people. Nearly a hundred years later, a similar situation repeated itself in Bangladesh in 1943. The Gulf of Bengal had been known as "the rice bowl of India." During the period of World War II, a severe cyclone hit the country at a time when farming activities in the country had been severely affected by the war. Instead of managing the crisis effectively, Britain continued to export food out of Bengal, just as had it been done about 100 years earlier in Ireland. Of course, in the case of Bengal it must be stated that the coincidence of events, the cyclone, and World War II contributed to the poor crisis management.

Global Institutions

In addition to the above, global institutions occupy a very critical role where their influence and efforts are appropriately channeled. It cannot be disputed, for instance, how the efforts of organizations such as the Food and Agricultural Organization (FAO) and the World Food Programme can help mitigate and respond to crisis. Similarly, economic institutions such as the World Bank and the International Monetary Fund (IMF) can make a positive contribution. However, in certain cases some critics have argued that some decisions by global institutions have proven ineffective in crisis management. In 2002, for example, Malawi (one of the poorest countries in the world) experienced one of the most critical food crises that the country had ever faced. The World Food Programme was extremely effective in responding to the crisis. However, the case of the Malawi famine raises many issues for crisis management. Despite sporadic food shortages, recent history indicates that Malawi had largely averted extreme food shortages and was relatively food sufficient. Prior to 2002, and apart from the famine of 1949, Malawi had not seriously faced extreme food shortages. Since gaining independence from Britain in 1964, the country continued on its course to strengthen its focus on food security. This commitment to agriculture and food security was underlined by the importance and high standing attributed to the Ministry of Agriculture within the Malawi government cabinet. Despite Malawi's imbalanced acreage of land allocated to tobacco farming over food crops, there was sufficient evidence to underline Malawi's commitment to food security and self-sufficiency. Food security approaches were actively pursued by the Malawi government prior to the food shortages of 2002, and this strategy also included providing government subsidies to subsistence farmers for agricultural inputs.

In further strengthening its food security, a few years earlier the government of Malawi had also built grain banks (reserves) and stocked them to act as a safety net in the event of severe food crisis. Indeed, the Agricultural Development and Marketing Corporation (ADMARC), a Malawi government institution, had historically played a key role in buying excess grain harvest from local people, who are mostly subsistence farmers, and selling it back to the people at affordable prices when food was scarce. Although the food crisis was aggravated in part by flooding that was immediately followed by drought, the IMF and World Bank have been widely criticized through claims that the institutions exerted pressure on the Malawi government in relation to the Structural Adjustment Programme (SAP) debt repayments and liberalization and the government use of food reserves. This significantly contributed to the food shortages in Malawi in 2002. It would seem that the famine in Malawi could have been averted by informed decision-making-founded research both vertically and horizontally, understanding thoroughly the relationships between different structures and processes. Knowledge and information gaps and communication inefficiencies at both international and national levels and inability to build capacities and robust crisis management structures and governance can render a crisis unmanageable.

Perhaps most important, national institutions need to be confident of support from vertical powers by international institutions in appreciation of national contexts and the help required by states to have effective crisis management plans, robust communication processes, and information systems that are managed by trained staff and volunteers.

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See Also: Carrying Capacity; Drought; Food Security; Global Food Crisis; Refugees and Forced Migration.

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Federal Bureau of Investigation (FBI)

The Federal Bureau of Investigation (FBI) is one of the main actors that respond to crisis situations in the United States. Hence, it is important to know its organization, mission, tasks, and operations. The FBI is a federal law enforcement agency. It is one of many federal organizations tasked with law enforcement. The FBI was founded as the Bureau of Investigation in 1908 by executive order of President Theodore Roosevelt. Its name was changed in 1935. The head of the FBI is the director, who is appointed by the president and confirmed by the Senate. The FBI director is appointed for a maximum of 10 years and answers to the attorney general. Congress oversees the FBI's budget appropriations, programs, and chosen investigations. The director of national intelligence oversees the FBI's intelligence activities.

The FBI headquarters is in Washington, D.C. The FBI has 56 field offices that are located in major cities of the United States. Furthermore, the FBI has smaller FBI field agencies in various cities and towns nationwide. The smaller FBI field agencies are called resident agencies, and there are roughly 380 resident agencies in the country. Moreover, FBI international offices exist in U.S. embassies throughout the world. The FBI international offices are called legal attachés, and there are more than 60 legal attachés (liaison offices) in the world.

Special agents for the FBI are trained at the FBI Academy in Quantico, Virginia, for 20 weeks. The FBI had a total of 35,664 personnel as of February 2012. Although 13,778 of them were special agents, 21,886 of them were support personnel (professional staff), such as intelligence analysts, scientists, information technology specialists, language specialists, and other professional support personnel. The FBI special agents make arrests, carry firearms, and serve warrants.

Investigation and Intelligence

The agency is an operational (mainly investigation) enforcement agency as well as an intelligence agency. The FBI has two primary missions: investigation and intelligence. Its particular mission is to fight against terrorism and foreign intelligence. The FBI collects, shares, and analyzes intelligence to back its own and also its partners' investigations.

The FBI investigates and prevents international and domestic terrorist activities. The FBI is the lead federal law enforcement organization to investigate cases relevant to weapons of mass destruction, including nuclear weapons and radiological, chemical, or biological agents. Crisis managers outside law enforcement may request the assistance of the FBI. For example, the FBI Weapons of Mass Destruction Countermeasures Unit (WMDCU) has exercises on weapons of mass destruction (WMD). Those exercises meet the specific needs of crisis managers, who may ask for the assistance of the FBI on WMD. In addition, the FBI Crisis Management Unit (CMU) provides comprehensive crisis management training to federal, state, and local agencies. The CMU also conducts research in the field of crisis management, particularly information techniques and new crisis management procedures.

Terrorism-related incidents such as money laundering, violence at airports, and assaults against U.S. officials are also investigated by the FBI. Although bombing incidents are under the jurisdiction of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), the FBI conducts collaborative investigations with the ATF. In drug trafficking incidents, the FBI conducts investigations together with the Drug Enforcement Administration (DEA). While prosecuting drug trafficking cases, the assets of the criminal enterprise are seized in order to eradicate the whole criminal organization.

Private sectors help facilitate the FBI's work in tracking down terrorists and criminal and the

FBI works with private-sector organizations to prevent physical and electronic attacks and intrusions. The Domestic Security Alliance Council (DSAC) was created as a partnership between the private sector and the FBI to enhance the effectiveness of information exchange. InfraGard, another partnership in which private organizations share intelligence and information such as expertise and strategies with the FBI, has more than 30,000 members from the private sector. FBI agents who work for the InfraGard program contribute invaluable information and news such as case studies, threat alerts and warnings, overall threat assessments, and vulnerabilities.

Federal law authorizes the FBI to investigate all federal crimes that are not in the investigative jurisdiction of another federal law enforcement agency. The FBI investigates major and complex criminal incidents that any local and state law enforcement agency may not deal with alone. The FBI investigates major crimes such as cyber crime, public corruption, violations of civil rights (such as hate crimes or human trafficking), organized crime, white-collar crime, violent crimes (such as bank robbery, art theft, and crimes against children), and major thefts. Two hundred violation categories of federal law allocate a duty to the FBI to investigate the criminal cases.

The FBI assists federal, state, local, and international law enforcement agencies. For instance, the FBI supports other law enforcement organizations by providing various services such as laboratory examinations, fingerprint identification, and police training. Scientific examinations of evidence are conducted by the FBI laboratory for all federal, state, and local law enforcement agencies in the United States at no cost. The FBI shares identification and criminal history information with federal, state, and local law enforcement organizations. If a person is wanted by a local police department for committing a crime, the wanted person's name and identifying information are also entered into the computerized database (National Crime Information Center), which is accessible to all law enforcement organizations throughout the United States; his or her fugitive status will be seen by any law enforcement agency during an inquiry. The FBI trains some qualified officers from state and local law enforcement agencies. The FBI National Academy provides training to mid-level international, local, and state police officers. It is believed that this training program increases cooperation between local law enforcement agencies and the FBI. The FBI special agents sometimes work together with officers of state, local, and other law enforcement agencies on task forces created to fight terrorism, narcotics, organized crime, gangs, kidnapping, bank robberies, and motor vehicle theft.

The agency also works through federal prosecutors. FBI special agents take an individual arrested by the FBI into custody until the first court appearance. The arrestee is photographed and fingerprinted, and his/her voluntary statement is taken while in custody. The FBI takes intelligence on a confidential basis from the informants who are not FBI employees. Informants may be paid compensation.

The FBI Critical Incident Response Group (CIRG) gives prompt expert assistance to cases in a crisis, such as crisis management, the abduction or mysterious disappearance of children, hostage negotiation, special weapons and tactics, and criminal investigative analysis. The CIRG also supports FBI undercover personnel's appraisal, selection, and training processes.

The FBI keeps statistics on criminal incidents committed in the United States. The Uniform Crime Reporting (UCR) program was created by the FBI to collect information on crimes reported to law enforcement organizations. The main crime categories are forcible rape, murder, robbery, burglary, aggravated assault, arson, larceny-theft, motor vehicle theft, and hate crimes.

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See Also: Cyber Crime; Hostage Taking and Negotiation; Terrorism; Weapons Trafficking.

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Federal Emergency Management Agency (FEMA)

The Federal Emergency Management Agency (FEMA) is an agency of the U.S. government responsible for disaster mitigation, preparedness, relief, and recovery. FEMA describes its role as consisting of a variety of different components: providing service to disaster victims, integrated preparedness, operational planning and preparedness, incident management, disaster logistics, hazard mitigation, emergency communications, public disaster communications, and continuity programs. An independent agency beginning in 1979, FEMA became part of the then newly formed Department of Homeland Security (DHS) in 2003. Several documents and pieces of legislation cover how FEMA is organized and operates, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act, an amendment to the Disaster Relief Act of 1974), the Homeland Security Act of 2002, and the Post-Katrina Emergency Management Reform Act (PKEMRA or the Post-Katrina Act).

FEMA follows an all-hazards approach, focusing on preparedness and response to all types of hazards, including natural, human-made, and attack. Natural hazards are naturally occurring events, such as tornadoes, that may threaten a population. Human-made hazards are events like chemical or oil spills. Attack hazards include events such as terrorist attacks. FEMA is organized to respond to any of these types of disasters at any time. Efforts to mitigate, prepare for, or respond to each of these types of disasters can often be used during other types of disasters. For example, communications equipment used in relief efforts for a major flood can and should also be used in responses to a domestic terrorist attack. Although the specific issues that need to be address in preparedness or response to different disasters may vary, basic needs and approaches like good communication are universal and should be applied to all disaster responses.

Although the term *FEMA* is generally used to refer to federal-level government response, the agency is also organized to account for and assist with preparedness and response efforts at the state, tribal, and local levels. Through FEMA's encouragement, training, and planning for communication and cooperation across agencies in these different levels of government, as well as among nongovernmental and private organizations, crisis managers are ready to offer assistance to other areas as needed and to accept help when their own areas are affected by disasters of any type.

Four Stages of Disaster

Disasters have four phases in FEMA's approach: mitigation, preparedness, response, and recovery. Mitigation efforts are those steps taken to reduce the effects a disaster will have on an area or the likelihood that a hazard will ever hit an area at all, for example, the construction of levees to reduce the chance of a flood affecting an area or to reduce the amount of water that would enter a space during a flood. Preparedness efforts are those efforts made to actively prepare for an upcoming disaster, for example, predicting a hazard and where it will strike, issuing evacuation orders, and opening shelters. Response efforts occur during and just after a disaster, for example, emergency rescues and the distribution of food and water. Finally, recovery efforts are long-term efforts to rebuild after a disaster in an attempt to return things to as normal a situation as possible, for example, the reconstruction of schools and businesses or the repaving of damaged roads. All of these are steps that crisis managers should be involved in, according to FEMA's own literature and training manuals.

FEMA relies on response at different levels of government. Residents of the impacted area are their own first line of responders, and FEMA's organization begins with the idea that these individuals and families have a certain amount of basic

Case Study: FEMA and Crisis Management in Hurricane Katrina

Focusing specifically on the Federal Emergency Management Agency's (FEMA) role in crisis management, the following case study of Hurricane Katrina (hereafter "Katrina") examines the storm's effects on U.S. states. It does not address the storm's effects on the Bahamas. To narrow this discussion further, this case study looks primarily at the situation in New Orleans and does not deal with FEMA's role in other affected areas like Florida, Alabama, and Mississippi. Problems emerged with FEMA's crisis management and response to Katrina. Some of the effects of such problems were made public with extensive media coverage of the events in New Orleans following the storm's landfall. Accusations of problems in FEMA's response efforts in all four phases of a disaster emerged from media, academic, expert, and public circles. Understanding both what went wrong and what worked in prior disasters and examples of crisis management allows managers to be better prepared for future crises.

FEMA's mitigation phase of disasters includes efforts to protect areas and populations from potential hazards. The threat of a hurricane hitting New Orleans was nothing new to crisis managers. For years, problems had been developing with the levee system that below-sea-level New Orleans relied on for protection and had been discussed by various experts. More specifically related to FEMA, these mitigation efforts also included training for the scenario of a significant hurricane hitting New Orleans. The development of the Hurricane Pam training exercises (also known as the Southeast Louisiana Catastrophic Hurricane Plan) was a success for crisis managers in FEMA's mitigation efforts. However, the implementation of the exercise and steps taken to improve mitigation after the exercise were less successful at various levels of government. This lack of preparation based on such mitigation efforts made them largely a failure, setting the stage for future problems.

Local Problems Thwart FEMA's Efforts

Without fully realized mitigation efforts, problems quickly emerged in the preparedness phase. Katrina struck Florida as a Category 1 storm on August 26, 2005. The storm made landfall just north of Miami and killed at least six people. When Katrina finished crossing Florida, it hit the warmer waters of the Gulf of Mexico and began to grow in size and strength. As the storm approached the Louisiana and Mississippi Gulf Coast, the number of delays and problems with evacuation efforts quickly mounted. FEMA did have evacuation guidelines in place, but crisis management efforts ultimately failed, as these guidelines do not seem to have been followed at the local level by leaders like Mayor Ray Nagin. This was further complicated by the fact that when evacuation orders were implemented, not all residents did or could evacuate. Not enough transportation was organized to evacuate vulnerable residents who wanted to leave the city (particularly the poor, racial and ethnic minorities, and the elderly), leaving them to shelter-in-place or to make their way to shelters of last resort. Local and other government leaders and crisis managers do not seem to have been prepared to take vulnerable populations into account and to deal with their special needs, such as the lack of transportation or funds to evacuate.

Problems Mount

The storm made landfall on the Louisiana and Mississippi coastline on August 29. It was during and immediately after the storm, the response phase, that many of the widely publicized problems with FEMA's crisis management surfaced. Federal assistance was seen by many as slow to respond. While some responders were on the ground in the affected areas soon after the storm, distributing what aid they could, problems in crisis management quickly emerged. Not enough resources were on hand for distribution, with the amounts of ice, water, and food seen as necessary in planning for such an event with exercises like Hurricane Pam far higher than what had actually made it to staging areas. This lack of resources was complicated by public and media discussion of which resources should be available, where they were or should be distributed, and who was eligible to receive them.

Communication problems emerged at and between different levels of government as people who needed to make important decisions did not

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always have the information they needed to do so. And there was a lack of resources, mostly vehicles like buses, to evacuate the residents who had ridden out the storm in the city and its emergency shelters (many of whom were part of vulnerable populations). Better resources and communication were clearly needed at all phases of Hurricane Katrina response in New Orleans, and in other areas, for effective crisis management. Crisis managers must be aware of potential problems such as a lack of response by local leaders and unprepared vulnerable populations in order to be able to effectively manage crises and help residents who need assistance.

resources to initiate response efforts themselves. Next is the local level of emergency response, wherein cities and counties have their own emergency response and management systems in place to aid citizens. Tribes and states are, in turn, in charge of response when local governments are unable to provide enough resources or manpower to deal with a disaster. At these lower levels of government, agencies and officials generally cooperate with other nearby governments and arrange for assistance in times of emergency as needed. Such agreements are usually made well in advance of crises. Finally, there is the federal level of response, which is used when lower levels of government cannot manage a crisis on their own. Crisis managers at each level should know their area, potential hazards that may affect it, and how they need to interact with and ask for assistance from other governments they have prearranged agreements with or from higher levels of government.

Following the terrorist attacks of September 11, 2001, FEMA became part of the newly formed Department of Homeland Security in 2003. This marked a general shift in the government about the focus of crisis management. Instead of focusing primarily on disaster response, much of the government's focus turned to terrorism preparedness.

Over the years, FEMA has been criticized at several points for failed crisis management efforts. In 1992, FEMA faced significant criticism for its response to Hurricane Andrew. The agency also was widely blamed for the significant problems in disaster planning, emergency response, and crisis management that were made public by nearly 24-hour news coverage during and after Hurricane Katrina in 2005. Following each such occurrence, government officials and agencies initiated reviews to determine what had gone wrong and how FEMA should address these issues. The aftermath of such review post-Katrina was a new public law, the Post-Katrina Emergency Management Reform Act, in 2006. The Post-Katrina Act directed FEMA to create a National Preparedness System for response to all types of disasters, including natural, human-made, and attack.

The Post-Katrina Act follows on a history of FEMA's efforts to encourage cooperation and coordination among various levels of government, nongovernmental organizations, and the private sector. Such cooperation and coordination are critical to effective crisis management. Without cooperation and coordination in communication, resource distribution, planning, and other critical disaster mitigation, preparedness, response, and recovery efforts, crisis management does not work to the greatest benefit of everyone affected by disasters.

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See Also: Cabinet Office, UK; Department of Homeland Security (DHS); Emergency Management Agencies, City and County; Stafford Act; State Emergency Management Agencies.

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Financial Risk Management in Higher Education

Why would a rational person decide to take on a mortgage for a home that she or he cannot afford? Why would a rational decision maker from a reputable financial institution provide a mortgage to that person knowing that she or he cannot afford it? As demonstrated throughout the recent real estate boom in the United States, as well as through the research of various behavioral economists, rational people make irrational decisions, and oftentimes these decisions are based on incomplete information. No person or institution is immune to this tendency. Consequently, it is absolutely essential for both individuals and institutions (that is, groups of individuals) to develop strong and scalable practices for managing financial risk (that is, the possibility of downturns that could potentially lead to financial insolvency). In the case of higher education, financial risk management plays a key role in helping guide the decisions of college and university leaders to ensure the continued viability and positive societal contributions of their institutions.

In an ideal world, financial risk management would be standardized and incorporated into regular budgeting and planning processes of higher education institutions. Instead, however, these exercises tend to stem from sudden or unexpected needs to consider significant changes to the budget and financial plan. The changes driving an increased focus on financial risk management are usually higher level and strategic in nature, and may have goals such as growth and institutional development (as in the case study), a refocus on the organizational mission, and/or the mitigation or avoidance of major obstacles or issues facing the institution. The driving motivation aside, once financial risk management is made a priority for a higher education institution, the facilitating processes and tools (technology) should be (1) designed in a comprehensive manner, (2) built to allow for dynamic modeling across multiple fiscal years, (3) flexible enough to adapt to a wide range of ideas and potential modifications to current financial plans, and (4) fully integrated with current financial plans so that potential changes in key financial metrics can be modeled.

Once the processes and tools for financial risk management are put in place and the modeling is performed, the results of the exercise must be effectively summarized and appropriately communicated. Although elements of the approach to the summarization and reporting of results may vary greatly by institution, there are a few key tenets that every institution should maintain. First, graphics should be used to summarize the results. This is particularly helpful when dealing with large and complex financial data sets. Second, the results should show the potential financial impacts over a long-term period of time (preferably 10 or more fiscal years), and third, the potential impacts should be compared against the current (baseline) financial plan and external benchmarks over that same period of time. In terms of communicating the results to the board and senior management of the institution, the chief financial officer (CFO) should coordinate and develop the communication strategy with the executive leadership of the institution (for example, the president, executive vice president, and provost).

Looking Ahead

In the case study, the university's integrated and comprehensive approach to the financial risk management exercise provided coherent and empirical analysis to help guide leadership to

Case Study: Financial Risk Management at a Large Private University

Recently, at a private university on the east coast of the United States, large in size and well established, university leadership and the board of trustees endeavored to perform a large-scale financial risk management exercise to strengthen and further develop this area as a cornerstone to its comprehensive risk management practices. The university, for the most part, had emerged from the financial crisis of 2008 without many lasting negative financial impacts. At this tuition-driven institution, applications and enrollments continued to rise, along with the academic quality of the student body. Recognizing this as a unique opportunity and environment for growth, the university's top leaders and the board quickly moved forward to develop a comprehensive strategic plan to accelerate growth in key areas and disciplines. As the planning process evolved, the university's office of budget and financial planning was tasked with gathering, organizing, and projecting all of the foreseeable financial impacts of the forward-looking, 20-year strategic plan. The plan, which included both physical and operational (programmatic) investments, needed to be integrated with the university's existing financial plan. This meant that every potential financial impact needed to flow through the university's existing 10-year financial model in order to show the incremental impact of any combination of the strategic decisions being made.

Method

A fairly simple, Microsoft Excel–based financial model was built to (1) list each of the strategic decisions being weighed, along with its estimated annual financial impact, (2) allow selection of any combination of those decisions (line items), and (3) aggregate the net impact of those selections on some of the university's key financial metrics. Considering the key financial information provided by the balance sheet, the statement of activities (income statement), and the statement of cash flows in the university's consolidated financial statements, the CFO for the university advised the president, the board, and other senior university leaders that the focus for evaluation of the plan should be on three key metrics: (1) liquidity (defined as the university's cash on hand and short-term investments that could be liquidated in 30 days or less), (2) debt (defined as the university's long-term outstanding debt), and (3) leverage (defined as the ratio of expendable financial resources to debt). The impacts that the plan would have on these three metrics would, as the CFO explained, be key determinants of the university's ongoing financial health. When taken together, the metrics capture fluctuations in net income flows, demonstrate the institution's ability to pay its debts, and project forward changes in assets and liabilities. Consequently, these metrics also weigh heavily in assessments performed by the major debt-rating agencies.

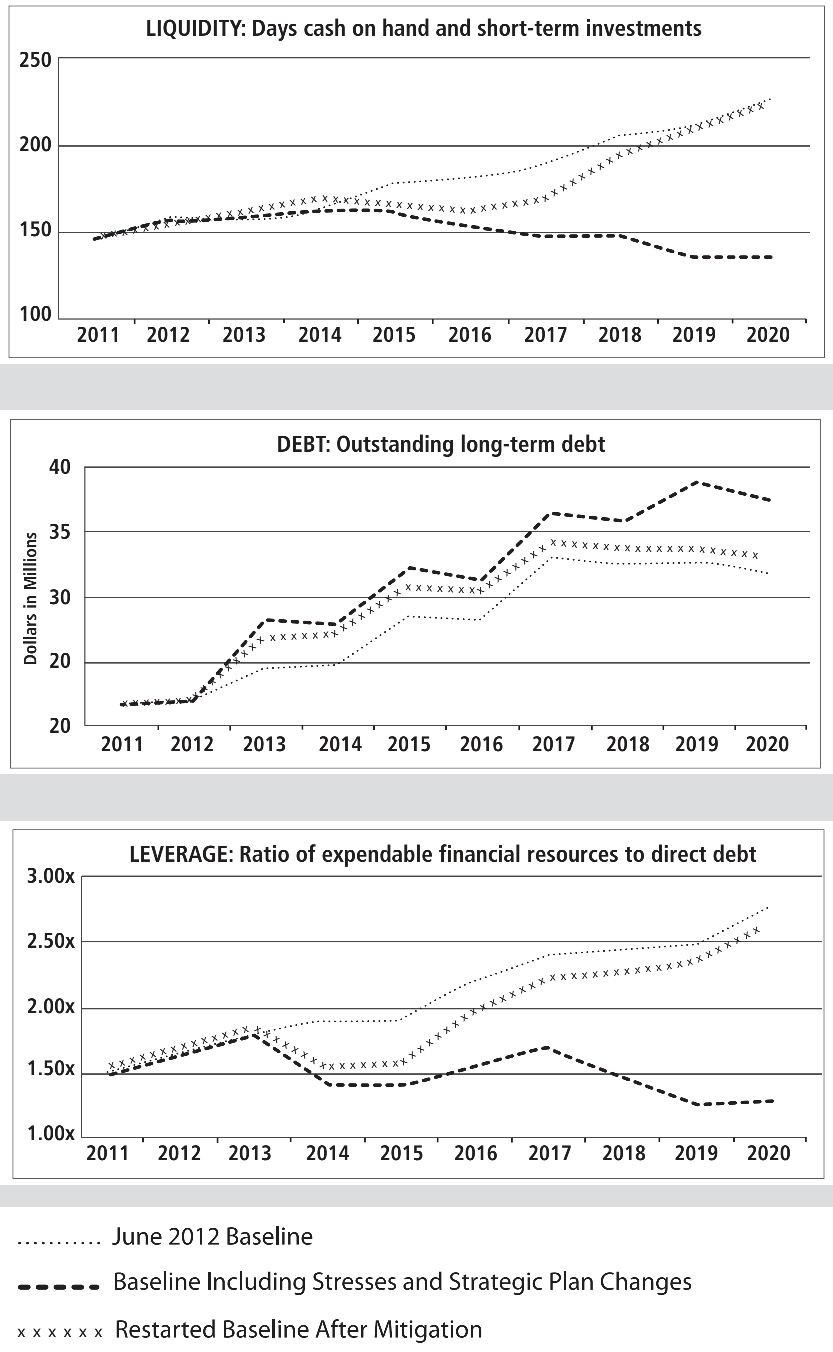
Stress Tests and Mitigation Strategies

Considering the heightened economic risks in the current environment in which the leaders of the university were planning for future growth, various "stress tests" were developed to dynamically demonstrate the financial impacts that might result from minor, moderate, or severe financial stresses on the university. Using the same three metrics for evaluation of the strategic plan (liquidity, debt, and leverage), the office of budget and financial planning worked with the CFO to develop an assortment of "stresses" (for example, reductions in planned revenue growth and greater-than-planned increases in various categories of expense). The same methodology for modeling the potential impacts of the strategic plan was employed for testing these stresses. This enabled the planning team to demonstrate the impacts of items from the strategic plan alongside the impacts of the stresses.

In addition to modeling the impacts of the strategic plan and the stresses, mitigation strategies were also identified, and their positive financial impacts were estimated and made available for selection in the model. Mitigation strategies included items such as reductions in various categories of controllable expenses, increases in controllable revenues, and asset sales, as well as "off ramps" and "on ramps" to the strategic plan. The "off ramps" and "on ramps" to the strategic plan included reductions and eliminations of certain strategic plan items, as well as new potential revenues that could be captured to offset the increases in allocations of financial resources required by the strategic plan investments.

Results and Communication

Through the use of these three line graphs, the planners were able to show how the key financial metrics (liquidity, debt, and leverage) would shift over time (over the course of 10–20 years) depending on the selections chosen from the strategic plan items, stresses, and mitigations. Results were summarized in a presentation that outlined the approaches taken, the processes used, and the logic behind the decisions made to arrive at the desired results. The executive vice president and the CFO then presented the findings to certain key and active members of the board of trustees' finance committee. After incorporating their feedback and recommendations, a final document was presented by the president and CFO to the full finance committee, and then ultimately to the full board of trustees during the annual budget cycle.



make rational and informed decisions about the future of the institution. It will be equally, if not more, important for the university to continue analyzing its current financial health and risks based on the same metrics (liquidity, debt, and leverage) used for the evaluation of the short- and long-term plans. As the strategic plan is implemented and operationalized, and as the university experiences financial fluctuations anticipated by the stresses and mitigations, it is essential to continue to monitor the key financial metrics to allow decision makers to recommend corrective actions and changes in course to continue to best guide the university to achieve its goals.

In the broader spectrum, the economic and political climate in the United States continues to create an environment in which not-for-profit higher education institutions must look beyond their intrinsic values and begin to extrinsically prove their worth to the public. From this flows an increased focus on transparency and accuracy of financial data and stewardship. Thus, it is critical, now more than ever, for higher education leaders to comprehensively evaluate and effectively manage the myriad financial risks associated with maintaining current operations and planning for the future of their institutions. Proactive and consistent measuring and testing of the financial health of higher education institutions, for both the short and long term, is essential to the continued success and value proposition of such enterprises.

Although the focus of this article is on financial risk management at higher education institutions, the author acknowledges that effective enterprise risk management must encompass the management of other types of risk as well, such as operational, regulatory, and reputational. Financial risk management should accompany and be integrated with the management of these and other types of risks.

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See Also: Auditing; Budget Crisis; Business Impact Analysis; Debt Crisis; Decision Making Under Stress; Risk Analysis; Risk Assessment; Strategic Plans.

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Fink's Crisis Life Cycle

Steven Fink's model charts the life span of a crisis, documenting in sequential stages distinct communication constraints and demands faced by organizations. Thus, the model has predictive power that aids in both crisis response and crisis planning. The model is also widely applied by crisis communication scholars.

Business-Oriented Focus

Although fitting for other crisis types, Fink developed his model specifically from a "business-oriented point of view." From this perspective, organizations are in a potential crisis situation when the event is doing the following:

- Escalating in intensity
- Falling under close media or government scrutiny
- Interfering with the normal operations of business
- Jeopardizing the positive public image presently enjoyed by the company or its officers
- Damaging a company's bottom line in any way

Fink sees crises as "turning points" or crucial moments for organizations where the situation is either going to improve or escalate in severity. If recognized and resolved, events never mature into full-blown crises. If, however, problems escalate into a crisis, the event follows Fink's four stages.

Disease Analogy

Using an analogy of human illness, Fink establishes four sequential stages in "the anatomy of a crisis." As with any crisis stage model, time is an imprecise variable. Fink's four stages can unravel in a brief amount of time, or years can pass before all four stages are manifest. If an event has truly reached the crisis level, however, all four stages must occur.

1. ***Prodromal stage crisis stage:*** Prodromes are symptoms in the human body that, if recognized and treated early, can prevent a serious disease from developing in a patient. Likewise, prodromes in organizations are signs of serious risks that, if

unrecognized or unattended, will escalate into crises. Some prodromes are recognized, but no action is taken. This failure to respond may result from excessive bureaucratic structure or unethical behavior. For example, Fink explains that officials received warnings of potential problems at the Three Mile Island nuclear power plant more than a year before the near meltdown at the facility. An investigation revealed a decision-making structure that impeded the facility's ability to respond expediently. In contrast, Peanut Butter Corporation of America received a clear warning that its peanut paste, an ingredient sold to many companies, was contaminated with salmonella bacteria. Yet the organization shipped the product, contaminating hundreds of products and infecting thousands of consumers. Finally, prodromes may be so subtle that they are nearly undetectable. Such warning signs are typically recognized retrospectively during the chronic phase of the crisis that is discussed in stage three.

2. ***Acute stage crisis stage:*** Fink characterizes the acute stage of the crisis as "the point of no return." By this point, some damage has already occurred. The question then becomes how much worse will the situation get before conditions improve? Observers often mistakenly assume the acute stage is the entire crisis. For example, when an airplane crashes, the crash itself and the immediate response constitute the acute phase. Yet, the crash itself is only the beginning of an intense investigation by regulatory agencies and complex legal challenges.

The acute stage is typically the shortest duration of Fink's four stages. A plane crash, for example, typically has an acute phase of several hours. Some acute phases are much longer. For example, conditions continued to intensify for days after the levees were breached in New Orleans. The Deepwater Horizon oil spill in the Gulf created an acute phase for BP that lingered for weeks. Despite the uncharacteristically long acute stages for these two crises, they were, by comparison, much shorter than the other phases of the two crises.

3. ***Chronic stage crisis stage:*** Using a vivid metaphor, Fink describes the chronic stage as the period during which the "carcass gets picked clean." Investigations by relevant government agencies, audits, exposés by the media, lawsuits, and extended public relations campaigns designed with hope of repairing the organization's image typically appear in the chronic stage. Because the acute stage is past, those participating in the chronic stage have the luxury of time. Investigations can go on for years, making the chronic stage the longest in Fink's four-stage model.

Internally, the chronic stage is where organizations learn from the crisis. A meticulous analysis of what the organization did right and what it did wrong enables the organization to fortify itself against future crises. Those organizations that rush through this self-assessment process are more likely to experience similar crises in the future.

4. ***Crisis resolution stage:*** Continuing with his illness analogy, Fink declares that the resolution stage occurs when "the patient is well and whole again." Once a prodrome is identified, a crisis manager's goal is to reach the crisis resolution stage as quickly as possible. Each misstep taken by the organization during the crisis, either intentionally or unintentionally, prolongs the other stages of the crisis. In fact, the burden of the crisis is so overwhelming for some organizations that they are dissolved before ever achieving resolution.

Application

Fink's model has been applied to a wide variety of crises over the past three decades. Scholars typically use Fink's stages to characterize the progress organizations have made or failed to make toward resolution. For example, the model was used to examine the troubling response of the Roman Catholic clergy to accusations of sex abuse, questionable responses to prodromes in the coal industry, the September 11, 2001, terrorist attacks, and the SARS outbreak. Scholars have also used the model to structure their theoretical analyses of cultural issues in crisis communication, general preparedness strategies, and building collaborative relationships in crisis planning. These diverse applications testify to the model's durability and flexibility in contributing to our understanding of crises and effective crisis communication.

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See Also: Crisis Communications; Crisis, Definition of; Public Image; Public Relations; Response.

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Fires

Over the centuries, fires have induced significant impacts on lives, property, cultural heritage, our environment, and continuity of operations of affected businesses, whether a result of human or natural causes. The magnitude of these events and the way these crises have been managed has evolved over the years. Centuries ago, for instance, fires could develop, spread, and consume large portions of cities (e.g., the great fires of Rome [64 B.C.E.], London [1666], and Chicago [1871]). These fires each destroyed large sections of their respective cities. Natural disasters have also led to large fires and extensive damage. This includes fires following earthquakes (e.g., 1906 San Francisco or 1995 Kobe), where fires caused relatively as much damage as the earthquakes themselves. Devastating fires have also been initiated by humans. This includes during war. This has resulted in considerable damage, including during World War II (e.g., Dresden, Tokyo, and London). Whether resulting from an accident or human-made, these "urban" fires once grew to immense proportions. To manage these crises better, building and fire codes over the last century have helped reduce these citywide conflagrations, and fires have been contained typically to the building of origin. However, during this period, there were numerous large life-loss fires that led to significant changes to building codes, laws, and ordinances to further address the need for additional life safety–related measures. These disasters have included the fires at the Iroquois Theater (1903), Triangle Shirtwaist Factory (1911), and Coconut Grove Night Club (1942). Crisis management has thus evolved over the centuries, typically through experience and past crises, yet there is more that can be done to prevent and mitigate these events from becoming large crises.

Planning and Mitigation

An important component to crisis management is planning in advance. This includes developing fire strategies and fire prevention plans. Fire strategies can be developed in accordance with building and fire codes, which should be developed, implemented, and enforced by country, regional, and local jurisdictions. Codes typically address various fire and life safety mitigation measures including egress, compartmentation, detection/alarm and suppression systems, firefighting equipment, and protection of the structure, among other requirements.

Codes need to address all types of buildings and occupancies, so their requirements can at times be generic and not tailored to specific buildings or an owner's specific needs (e.g., addressing unique hazards, protecting vulnerable collections, or preserving historic artifacts and buildings).

Performance-based, risk-informed codes in recent years have made significant progress in helping fill this gap. These help provide an approach to address specific objectives, goals, and hazards through risk assessments that result in the development of more tailored and integrated mitigation and prevention measures to help manage crises and keep disasters from occurring.

Crisis Management Training for a Fire

The concepts of creating awareness throughout a community and fire safety education for the public can help limit an event from escalating into a significant crisis. Awareness and crisis management training can have significant returns on investment in reducing the magnitude of the crisis. A few key areas are as follows.

Emergency evacuation training of occupants is important. These efforts help familiarize occupants with methods for detection of an incident, notification and communication methods during crises, locations of exits, evacuation routes, discharge areas, and gathering points outside

Explosions and fires erupt at the Barton Solvents facility in Valley Center, Kansas, July 17, 2007. The incident led to the destruction of the facility, projectile damage offsite, and the evacuation of 6,000 residents. Firefighters used a combination of foam and water to fight the massive blaze. The U.S. Chemical Safety Board, which found the most likely cause to be a static spark that ignited the air–vapor mixture inside a filling tank, released a case study and educational safety video depicting the sequence of events.

buildings. This training helps also to familiarize occupants with various evacuation strategies, as there may be a need to move only some of the occupants immediately in the vicinity of the fire first and not congest the exit routes, then evacuate others. Alternately, occupants may be required to relocate rather than totally evacuate, as in a high-rise fire for occupants on upper levels.

Emergency team drills can have a significant impact in familiarizing all with types of events that may occur and actions that need to be taken. This includes drills for occupants, fire wardens, and local emergency responders. These drills help familiarize the local responders with access to the site, locating the fire command center within the building, planning access to upper floors, locations of exit stairways, and other factors critical to their success in carrying out their duties.

It is also important to have the appropriate type of equipment for emergency responders onsite and in the appropriate locations for easy access. This equipment needs to be appropriately inspected, tested, and maintained so that it is available during an event.

Crisis Management and Emergency Response

Time is critical in managing a crisis. For a fire, it is important to detect a fire as early as possible and to notify appropriate personnel, including building management, the crisis management team, occupants, and emergency responders. Getting the emergency responders not only to the site as soon as possible but access around the building, into the building, and to the upper levels (e.g., stairs, elevators) reduces the overall response time to help evacuate occupants and to begin managing the incident before it has a chance to grow and develop further (e.g., contain, control, extinguish).

Setting up Incident Command Centers, communicating effectively with occupants and other emergency response teams, establishing staging areas for equipment, and allowing search and rescue operations to be conducted are all critical components in the early minutes of responding to a disaster that are important to the successful management of a crisis involving fire.

Once the fire has been suppressed, the emergency responders can begin to undertake salvage efforts to help ensure the fire is out and all occupants are accounted for. During this period, it is important to have appropriate professionals available to undertake immediate damage assessments to the site and building(s) as to its structural soundness, as well as the overall environment within the building and whether it is safe to conduct further salvage efforts or if there is a need for decontamination. Further assessment regarding damage to contents and business operations can be made as well.

Recovery From a Fire Event

Following a fire-related crisis, it is important that a crisis management plan be in place that details the recovery and restoration efforts. This should include plans for further detailed damage assessments, implementation of business continuity plans, public relations–related activities to keep the press and public informed of critical information as well as appropriate management of public perception, and conducting restoration plans so that one can return to operations as soon as possible from a fire event. These are all critical to properly manage fire-related crises.

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See Also: Emergency Responders; Incident Response; Response Team; Risk Analysis; Wildfire.

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Floods

A flood is an overflow of water onto landscape or urban settings that are usually dry. Floods are generally categorized by the physical source and properties of the excess water (e.g., river, lake, ocean, or debris flow), but the causes, effects, and dynamics also provide further criteria for flood characterization (e.g., storm surge or tsunami flooding, dam break, urban flooding, or flash floods).

The significant impact that inundations have on the territory, their always higher intensity and frequency, and their impact in economic and social terms pose floods as one of the major threats from the international to the local scale. As a result, crisis management must necessarily and carefully consider floods and develop specific preparedness, prevention, mitigation, monitoring, response, and emergency plans to limit their devastating effects.

Flood Categories, Causes, and Effects

Flood types are mainly associated with the natural feature and the physical process (dynamics) that originate the inundation phenomenon.

In particular, riverine and coastal floods are determined, respectively, by the excess water flow derived from fluvial channels and by the ocean surge that may occur, respectively, under severe hydrologic (e.g., rainfall) and climatic (e.g., strong winds, tropical cyclones) conditions. Those different and diverse factors may also combine, as in the case of estuarine floods, where the ocean and fluvial waters interact. Floods may be indirectly caused by another hazard, as in the case of a submarine earthquake (tsunami) or the collapse of a water retention structure (e.g., levee, dam).

A different categorization method pertains to the analysis of the flood dynamics that is mainly based on the duration and speed of the event, with slow floods usually driven by heavy rains and/or snowmelt on mid-large rivers and fast (flash) floods caused by convective precipitation (e.g., thunderstorm) in small river basins. The concentration of sediments that propagate with the flood wave is another factor, with mud and debris flows that mainly characterize alluvial fans and mountain areas.

The passage of the flood through the territory has often devastating direct effects connected to the physical damages to human properties (e.g., roads, bridges, buildings, agricultural fields, and industries) and casualties but also significant indirect effects such as business interruptions, the evacuation of affected people, water-driven diseases, and other hygienic issues. The negative environmental, economic, and social effects of floods are often temporary, but they may also last for months if an effective crisis management plan hasn't been developed and preliminarily implemented for tackling this natural disaster in both the pre-event and post-event period.

Flood Crisis Management

Floods are natural (extreme) events that cannot be avoided in most cases. Low-lying river valleys and coastal areas have always been the subject of recurrent inundations with overland river flows that in ancient times had also been the source of beneficial (fertilizing) effects, as in the well-known case of the Nile River flooding. Nevertheless, in modern times, urbanization and the increasing human activity and presence are contributing to an increase of the negative impact of floods, and the sustainable development of the territory cannot avoid considering the maximum inundation extent and dynamics as major factors affecting urban expansion and land use plans. Thus, even if the adverse impact of floods cannot be neglected, significant mitigation may be achieved by effective flood risk management that should include a preparedness, prevention, mitigation, monitoring, response, and emergency plan.

Preparedness means that people living in flood-prone areas are properly informed and prepared on how to behave in case of flood. A prevention plan aims to mitigate the effects of floods by decreasing the presence of construction and people within potentially inundated areas, not only by implementing evacuation plans, but also by promoting sustainable urban and rural development practices. In order to implement efficient evacuation and urban/land development plans, it is necessary to develop flood monitoring/warning and flood zoning projects. These nonstructural flood protection measures of people displacement and constrained urban development are generally implemented by advanced flood modeling and mapping studies that are able to forecast flood events in real time and to identify the extension and intensity associated with a predefined design flood scenario. Flood simulations are also used for designing structural measures for flood impact mitigation by means of dams, levees, seawalls, and any other structures able to intercept, convey, or store flood waters and prevent them from flowing through vulnerable areas. Whereas flood preparedness, prevention, and monitoring are active (pre-event) measures, flood response and emergency response represent the reactive actions that civil protection managers use during the event and the post-event phase to guide people to recover and reestablish the pre-flood conditions on the territory.

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See Also: Dams, Levees, and Seawalls; Early Warning Systems; Federal Emergency Management Agency (FEMA); Preparedness; Prevention.

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Food and Agriculture Organization of the United Nations (FAO)

The Food and Agriculture Organization (FAO), a specialized agency within the United Nations for international efforts on food security, was formed in 1945. Despite criticisms from some quarters during the FAO's history, it can be argued that the agency has been central in defining the direction of agricultural production and food security and seeking avenues for managing food crises worldwide. Since the formation of the Food and Agriculture Organization, there has been a plethora of challenges that have threatened or had direct impact on food security and agricultural production. Thus, the focus on FAO is unlikely to shift as situations singly or in combination trigger events that threaten to grow into food crises. As the world population has grown to over 7 billion, the organization at the center of food security has repeatedly faced challenges for managing crisis in the areas of food security and agriculture. How the world manages to negotiate crisis, prepares for and responds to food crisis becomes increasingly imperative, as the world expects the Food and Agriculture Organization to take the lead, with its Latin motto *Fiat panis*, meaning, "let there be bread."

Crisis Breeds Crisis

Political and social instability have often been closely linked to food insecurity. Well-founded or imagined fears regarding food insecurity can lead to social instability at regional, national, or local levels. Following fires in one of world's leading wheat-producing areas in central Russia in 2010, coupled with adverse weather patterns impacting food exports from Australia, food prices skyrocketed. As a consequence, unrest erupted in some parts of the world, including protests against bread price rises in Maputo, the capital of Mozambique, from where it was reported that about 280 people were injured as a result of unrest. Around the world in 2007, food shortages were some of the most severe in a generation, leading to riots from Mexico to Bangladesh and the collapse of governments in some parts of the world. The FAO was key, or at least seen to be key, when dealing with the crisis of food security from its headquarters in Rome. The opportunity and challenge of influencing decision making and international and national policy, as well as dealing with a range of complex interactions and triggers of food insecurity, was critical.

International Markets

One challenge that the Food and Agriculture Organization faced relates to how it could deal with food production that had historically been organized around local and national levels. Small-scale agricultural production based on local needs and subsistence farming was the norm in many countries, and self-sufficiency was promoted at a local level. However, globalization, partly defined as the harmonization of social, economic, and cultural practices, has over time impacted localized agricultural practices in favor of mass crop production. Mass crop production practices have generally been welcomed by proponents of globalization, free trade, and mass production, who argue that small-scale and localized agricultural production practices had failed to meet the changing needs of modern consumers.

Furthermore, proponents of free market principles have argued that the availability of food is likely to increase through mass production and free trade. There is indeed some evidence with regard to the benefits of globalization and liberalized agricultural markets. Critics of liberalization and globalization do, however, argue that these benefits have been overemphasized and are fraught with difficulties. Sensitivity to speculation in international food markets and food price increases have been cited as major shortcomings of globalized food systems and markets. Indeed, speculations on international food markets and responses by grain-exporting states have included the banning of cereal exports, resulting in catastrophic effects on food-importing countries. Following the 2007 food crisis, the FAO launched its Initiative on Soaring Food Prices to help small farmers boost their output and thereby earn more income. Along with the European Union, the FAO signed an initial aid agreement of about US$140 million to assist small-scale farmers who had been adversely affected by rising food prices.

Under the Special Programme for Food Security, the FAO engaged in the ambitious goal of halving the number of the hungry in the world by 2015 as part of the Millennium Development Goals.

Global Warming

Despite such efforts, the FAO is faced with a much wider debate relating to global warming, which as a phenomenon has been advanced by some scientists to be probably one of the greatest threats that the planet has ever faced. Its projected impacts relate to a rise in global temperature that might trigger erratic weather conditions. There are claims and counterclaims about its impacts on agricultural production. Its effects have been identified as ranging from the melting of glaciers to desertification to lowering of groundwater levels. Erratic weather conditions have been attributed to the increasing destruction of the ozone layer because of the level of carbon released into the atmosphere as a result of human activities, stripping the ground of its vegetation cover, the growing use of fossil fuels because of the increase in less environmentally friendly industries and car use, and the increase in methane gas from farm animals and the clearing of forests for agriculture using fires.

Although there has been less than unanimous consensus among scientists about the veracity of claims of human activities' impact on global warming, there have been some concerted efforts to formulate policies and make decisions to reduce carbon emissions. There has been an increasing interest in developing renewable energy sources instead of fossil fuels. Given the large volume of vehicles on Earth, vast pieces of land have been turned into growing crops such as sugarcane with the aim of producing ethanol. These efforts to mitigate disasters brought about by global warming have paradoxically been blamed for growing food security threats and crises. As biofuel crop production increases in acreage, food security has been said to be threatened by decreases in food crops, resulting in reduced annual food outputs. Indeed, this discussion is also about land use.

Land Use and Population

Another challenge facing the FAO is that food insecurity and resultant crisis are increasingly being attributed to the increase in world population as the most likely trigger. Surprisingly, little effort has been made at both international and national levels to address this issue, perhaps because of cultural sensitivities in some developing countries and declining populations in some developed countries. It has been argued that the world population is outstripping the rate at which the planet can be sustainable. Population issues and family planning have tended to be sensitive issues, and thus very little motivation has been shown either by states or by international institutions to discuss them. Rapid deforestation, the clearing of land that had previously been left untouched, has become commonplace as people seek to increase farm produce in order to sustain their families. Thomas Malthus's *Essay on the Principle of Population*, published in 1798, registered some of these concerns relating to the effect of population increase and its tendency to overwhelm food production.

The debate with regard to the increasing world population has opened a host of claims for solutions. Some have argued that scientific and technological advancement mean that the world can care for its growing populations through innovation. These claims suggest that biotechnology, including the development of genetically modified food, has the potential to address the problem of increasing populations, not through increased farmland but through increased yields. Thus, hybrid and modified varieties have been promoted to address this need. Indeed, scientific innovations have meant that the mass production of fish in farms has become increasingly possible. Furthermore, scientists have argued that if the world is indeed warming up, leading to an increase in drier soils, innovation may help in developing new crop strains that can withstand reduced soil water content and higher temperatures.

Despite evidence that points to some beneficial scientific innovations, critics of population increases have argued that the solutions do not lie in increasing production of farm produce but rather in decreasing the population. Similarly, fears have been raised about genetically modified varieties of fish escaping and cross-breeding with wild varieties of fish. Thus, the increase in genetically modified crops has largely been fiercely opposed in parts of Europe and the developing world. This is, however, not the only problem, for increasing need for both food and economic progress brings with it other challenges.

Crisis Management

The FAO, despite considerable criticisms, has arguably been active in meeting some of its objectives, including mitigation, preparedness, response, and recovery, through a range of means, as discussed below.

Partnerships and crisis management: Effective crisis management requires compliance through cooperation and standardized approaches to emergencies. The FAO has forged partnerships with a range of stakeholders in food, including the World Food Programme (WFP) and the International Fund for Agricultural Development (IFAD). It has often worked closely with the European Union on issues relating to farmers and food security. The training of farmers in integrated pest management under the Farmer Field Schools with support from countries has widely been acknowledged as a success.

It is important to understand the mandates of these three key agencies, which have related though somewhat distinct mandates that are complementary in many ways. This is also evident in the level of cooperation they have increasingly pursued. The FAO is the lead agency for technical expertise in food security, fisheries, agriculture, forestry, and rural development. IFAD's mandate is unique when considering the range of roles played by international financial institutions. Central to IFAD's mandate is to fund rural development projects aimed at improving the nutritional levels and living conditions for the poorest populations. The mandate for the WFP is that it is the leading emergency food aid agency of the United Nations. The WFP also assists with building structural assets and is involved in the promotion of self-reliance among poor communities.

In 1994, the Emergency Prevention System for Transboundary Animal Plant Pests Diseases focused on the control of diseases, including foot-and-mouth disease. As early as 1952, the FAO organized an international forum, the International Plant Convention, aimed at coordinating technical assistance with regard to pest outbreaks and maintaining a catalogue of pests. The Alliance Against Hunger and Malnutrition is an initiative developed by the FAO to address hunger and malnutrition, whereby local, international, and regional institutions are connected to share strategies for combating hunger.

Information systems and crisis: Robust crisis management systems, whether at the national or international level, require effective communication and information management. The Food and Agriculture Organization established the Global Information and Early Warning System (GIEWS) to monitor world food supply and demand. This is a useful tool, as early warning (of impending emergencies) furnishes the international community with invaluable and timely information. The United Nations organization also has its database, the FAOSAT, which covers statistics on agriculture, fisheries, forestry, land use, and population, among other areas.

Training and capacity building: Training and capacity building are critical to crisis management. The FAO has been very effective in some cases, including training farmers. Global partnership initiatives for plant breeding and capacity building are critical to crisis management. They create a network of critical stakeholders with a view to increasing capacity building for plant breeding. This is a mechanism to minimize the occurrence of crisis, including volatile food prices.

Conclusion

Despite criticisms of the FAO, a few critical factors have been established in relation to challenges of food and agriculture production: that food security is critical to social stability, that global markets and food chains impact the food needs of the population, that human activities are adversely affecting the environment and in turn affecting agricultural production, that technological advancement has some possible roles to play in food and agricultural production, and ultimately, that there is a growing need to strike a balance between economic needs and sustainable development.

Effective management demands effective systems not only within FAO management and operations but nationally, regionally, and internationally. Yet the food industry faces a complex system of interactions in terms of food markets, speculations, and anti–genetically modified crops sentiments of those motivated into the market by gains and climate change. Thus, crisis in the FAO seems to demand a much wider understanding of interests within the food industry and beyond. Ultimately, this discussion relates to the resilience of agricultural systems that can be enhanced by responsible policies at national and international levels. Food crisis is not confined within national borders.

Most disasters are not confined to simplistic national borders. For instance, global warming does not confine itself to national borders. Similarly, epidemics, including mad cow, foot-and-mouth, and Newcastle animal diseases, cannot realistically be confined within national borders. Global agricultural production problems call for local, national, regional, and international global solutions. International food markets have assumed an increasing role in food supply systems. Growing cross-border trade does not present only opportunities but also increased supply chain risks. Disruption to supply chains, market speculation, and food safety problems demand international agricultural solutions.

In the end, this discussion relates to the need for states and bilateral and international institutions to formulate coherent and integrated solutions aimed at disaster mitigation while being equally responsive to immediate human food needs. Thus, this demands formulating resilient national and international institutions facing agricultural production.

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See Also: Carrying Capacity; Climate Change Adaptation; Commodity Shortages; Drought; Famine; Food Security; Global Food Crisis; Global Warming; Overpopulation; Poverty; Vulnerable Populations.

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Food Security

Worldwide food security means that there is enough food in the global supply and that all people always have access to nutritious and affordable foods. A food-secure individual has access to enough food items, nutritionally and preferentially, to lead a healthy lifestyle. Food-secure households are those in which all members are assured consistent access to food items that meet dietary requirements. The notion of food security is conceptualized as adequate food provision through culturally acceptable methods. In other words, people are not forced to obtain food through violence or stealing, rely on emergency food resources, or employ other nonsustainable reactions to food insecurity. Lack of food security is an ongoing crisis, and organizations around the world endeavor to end growing trends of food insecurity.

The notion of food security is often misunderstood to mean food safety. Food safety initiatives deal with the hygienic handling of food in order to prevent foodborne illnesses. Resources like the National Center for Food Protection and Defense (NCFPD) focus on food safety. The NCFPD extends our understanding of and strategies for food protection through programs like modeling, education, and research in risk communication. Although food safety is not an accurate synonym for food security, this improper meaning is commonly used.

Food Insecurity

To better understand food security, food insecurity must be explored. Globally, people struggle to obtain adequate food for nourishment. Inability to consume sustaining food occurs for a variety of reasons: poverty, war-induced famine, diminished accessibility, disease, limited harvests, droughts, decreased food supply, and ignorance about wholesome food choices. Some individuals, households, and regions are more vulnerable to food insecurity because of social, political, economic, or environmental circumstances.

Poverty is a leading cause of food insecurity—both malnourishment and chronic hunger. Impoverished individuals and households lack the necessary resources to purchase foods. Buying nutrient-rich food items like meat and milk is often more expensive than purchasing grains or starch foods. Thus, impoverished households struggle to gain regular access to nutritious foods, correlating poverty with food insecurity.

Wars, warlords, and government damage to their own nations are other causes of food insecurity. Reports of unjust political regimes using war to gain compliance from citizens arise from around the world—tales of warlords intercepting United Nations (UN) supplies in war-torn countries and intentionally starving cultural groups into submission. Joseph Stalin's *Holodomor* is a historical example of how a government intentionally created food insecurity (and genocide). Government malevolence and reticence are odious causes for food insecurity.

Diminished accessibility to nutritious foods occurs because of social inequality or economic, political, and agricultural changes. For instance, problems with dwindling harvests affect already-struggling regions, leading to large-scale food insecurity for those who can't purchase imported (expensive) foods. Other examples of diminished access include declines in fish stocks or climate changes that make farming or animal husbandry difficult.

Natural disasters can weaken people's ability to access sustaining foods. Tsunamis, floods, droughts, fires, earthquakes, and landslides are just some of the ways nature creates voids in the global food supply. When foods become unavailable, people's access to necessary food is threatened.

Lack of education and apathy about nutritional foods is another key reason for global food insecurity. In other words, one surprising cause of food insecurity is dietary choices. Individuals and households can consume a large quantity of food and still be food insecure, meaning the food items selected are of poor nutritional quality. Consumption of junk foods, high-sugar items (e.g., sodas, pastries), and other unhealthy food choices can lead to food insecurity.

This does not address all of the reasons individuals and households remain food insecure. Poor budgeting skills, transportation issues, inability to self-farm, hefty bills, regional water deficits, delayed welfare payments, the need to send money home to struggling relatives, and land degradation are just some of the many reasons households struggle to establish food security.

Food Insecurity: A Crisis

As discussed above, food insecurity occurs for many reasons. Food insecurity is a growing global crisis because of its far-reaching implications in social, government, agricultural, and political systems. Some accept food insecurity as a normalcy when in fact it's a colossal crisis, impacting the well-being of countless individuals.

Furthermore, new crises can create or extend existing food vulnerabilities. For example, the decision to become a migrant worker not only separates family members, but also leads to reduced security in terms of daily meals and income for the family members (often children) left behind. Another example includes HIV/AIDS-infected persons. Prevalence of AIDS is an ongoing crisis because it is life threatening and reduces many households to poverty and food insecurity by (1) inhibiting a previously healthy family member from earning income, (2) shifting family resources to HIV/AIDS medications instead of food for the household, and (3) causing food-earning family members to allocate time to care for the HIV/AIDS patient. Migrant workers and the HIV/AIDS pandemic are just two examples of how a compounding crisis disrupts food security or intensifies existing food insecurity.

Global Goal: Food Security for All

Any individual, government, nonprofit organization, or policy maker wishing to effectively take on food insecurity must first understand it and then pinpoint vulnerable populations. In 2009, the Food and Agriculture Organization of the United Nations convened the World Summit on Food Security in order to discuss and problem-solve for the growing threat of food insecurity. This conference, UN partnerships, and goals like "Feeding the World in 2050" are powerful resources for systematically achieving global food security. Problems such as poverty, worldwide population growth, political hostilities, and other compounding issues all cause and interact to create patterns of food insecurity. Responsible individuals, organizations, and governments are joining the strategic fight toward global food security, a goal worth considering and attaining.

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See Also: Climate Change Adaptation; Drought; Famine; Floods; Multiple Disaster Problem; Poverty.

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Foreign Policy Crises

The study of foreign policy crises has been seen as playing an influential role in the development of a wider set of theories around crisis management. In particular, the literature dealing with such crises was important in shaping early attempts at defining crisis; this work on foreign policy crises served to influence subsequent work in other disciplines. At their core, foreign policy crises are seen to occur where the potential outcomes of the policy are at odds with the aims and goals of the state in a highly stressful and time-limited setting. There have been several seminal studies that have looked at foreign policy crises, including the Munich Appeasement, by P. M. Kennedy (1976) and J. L. Richardson (1988); the Cuban Missile Crisis, by G. T. Allison in 1969 and T. J. McKeown in 2001; and the wars in Iraq and Afghanistan, by D. Byman in 2008 and C. Kaufmann in 2004. Much of this attention has focused on the performance of key decision makers. Foreign policy crises have also taken on a new dimension with the increasing effects of globalization, which generates challenges for governments as they try to regulate and control the actions of powerful multinational corporations. The 2008 banking crisis illustrated the interconnected nature of the banking industry and the difficulties associated with regulating it, and the issue of regulation remains controversial. The continuing problems surrounding the euro have also generated challenges around foreign policies as governments, both within and outside the eurozone, have tried to deal with the demands of the crisis. Against this background, the notion of a foreign policy crisis can be seen to have moved away from its traditional setting to incorporate a wider set of contexts in which such crises can occur.

The scale and diversity of these crises make a full discussion of their implications here impossible and, as a consequence, this article focuses on three particular aspects of research in the area of crisis management that have developed from foreign policy crisis research. These are the performance of crisis decision teams, the role of latent and active error in the decision-making process, and the impact of unintended consequences (emergence) arising from policy making. It is recognized that such a selective approach can be problematic, and the aim here is to point to links into the wider theory of crisis management relating to these three elements, each of which can now be considered in more detail.

Performance of Crisis Decision Teams

The potential consequences associated with foreign policy crises have led to a focus on the quality of decision making within those groups who manage such events and the manner in which they cope with the stress associated with such conflicts. One of the seminal studies of crisis team performance was carried out and published in 1982 and 1989 by Irving Janis, who developed his groupthink concept based on a study of decision making within the Cuban Missile Crisis and other related events. The concept has also been applied to other crises including the Munich appeasement, by S. G. Walker and G. L. Watson in 1989; Vietnam and the Bay of Pigs, by R. M. Kramer in 1998; and various others involving foreign policy–related problems, by F. Bynander in 1998, J. K. Esser in 1998, and T. Forsberg and C. Pursiainen in 2006. These studies have generated a focus on research that has looked at the role of government leaders within this process and the impact that individual psychology or health might have on their decision-making capabilities. David Owen's research in 2006 and 2009, in particular, raised the issue of how senior politicians can be impaired as a function of medical or drug-related ailments and how this might impact decision making both in the buildup to and during crises. The centrality of these leaders within the decision-making process places them both as potential causal agents in the development of foreign policy (and by implication, the crisis, should it occur) and as key individuals in any response to the crisis as it occurs. David Mervin notes in his *Journal of American Studies* article, "Presidents, Precedents, and the Use of Military Force" (1998): "When it comes to the making of foreign policy, and particularly when crises of national security arise, the president, it seems, is inevitably, the main player, the senior partner." This issue of the centrality of key decision makers was also evident in the Cuban Missile Crisis and the debates that followed.

The Role of Error in Decision Making

The role of leaders within the decision-making process leads into the second aspect of foreign policy crises that is important here, namely, the role of latent and active errors. Issues of decision making within foreign policy crises have their origins in a number of celebrated studies. One of the key works was carried out by B. W. Tuchman into the origins of World War I, describing the processes by which decisions taken by world leaders generated a momentum that moved countries into conflict. Tuchman's account of the early months of the conflict highlights the manner in which errors in decision making were able to expose the inherent vulnerabilities within the political environment prevailing at the time. In more current terms, error was embedded in the system, and this latent error was exposed by the trigger event of the assassination of Archduke Ferdinand. The subsequent chain of events was akin to Charles Perrow's later notion of a system that is "tightly coupled" and "interactively complex." Tuchman's work has a wider significance, as it was deemed to be influential for President John F. Kennedy, who had read the book prior to the Cuban crisis.

The issue of latent and active errors also emerged in the aftermath of the second Iraq War concerning the issue of weapons of mass destruction and the possible predispositions of government leaders for regime change in Iraq. The role of the media as a means of framing the issues and shaping public opinion around the legitimacy of the conflict was also an important part of the strategy. In the United Kingdom, the notion of "spin" was seen in the media as a key issue in the aftermath of the war and formed a considerable part of the critique of Tony Blair's decision making.

More critical analysis by Christoph Bluth (2004) and James Humphreys (2005) has suggested that this analysis was more measured than many would believe to be the case. Intelligence failures have also been seen to lie at the heart of the inability to foresee and forestall the attacks on 9/11. The notion of error cost can be seen as an important aspect of foreign policy crises and one that has relevance to other forms of decision-making failure. The reluctance or inability of leaders to see the problems in their strategies is an issue that transcends international politics, although it has been seen to be an important element in the wars in Vietnam and Iraq and also relates to the ways in which multidisciplinary and multifunctional teams make decisions and the psychology of strategic rigidity.

The Impact of Unintended Consequences

The final area of consideration in this brief discussion of foreign policy crises concerns the emergence of unintended consequences arising out of such decisions. These consequences can be seen to relate both to the performance of crisis management teams and to the nature of error in the decision-making process. Given that many policy decisions have implications and effects that are not apparent for many years, these unintended consequences could be seen as an inevitable consequence of foreign policy. For example, the move in Europe to a single monetary policy without an overarching political structure could be seen as a precursor to the current crisis involving the euro. Emergent properties can be seen to emerge from problems where the interaction of elements within the problem space generate issues that have consequences that were either not foreseen or were not seen as credible in terms of likely risks at the time the decision was made. Within the context of foreign policy crises, perhaps the most obvious example is the role of the wars in Iraq and Afghanistan in generating motivations for jihadists to fight against Western occupying powers. This has also been seen as an issue motivating what have become known as home-grown terrorists, a problem that has been seen as especially important in the United Kingdom following the attacks in London and the thwarted attacks on transatlantic airlines. This process, often referred to as "blowback," can be seen as the unintended consequences associated with emergence in complex multilevel policy decisions. The process also relates to that of "error cost," according to David Collingridge (1984 and 1992) and the manner in which policy makers use science and evidence in the decision-making process. In the areas of foreign policy, especially for those problems where intelligence gathering and analysis are key contributors to the decision-making process, the potential for emergent conditions arising out of those decisions can be seen to be high.

Conclusion

This brief discussion of foreign policy crises has sought to highlight three issues that relate to the wider literature on crisis management. This discussion has not been inclusive and has left out issues that some might consider as essential components of any such discussion. This criticism is accepted and is an inevitable consequence of the constrained nature of an encyclopedia discussion. This brief discussion here should be seen as an entry point into debates around foreign policy crises that are both extensive and multilayered in terms of their complexity.

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See Also: Cabinet Office, UK; Groupthink; Interstate War; Terrorism; War Crimes; Weapons Trafficking.

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Fraud

Fraud is an action of intentional misrepresentation, committed when a criminal or civil defendant makes a misrepresentation of material fact; with intentional or reckless state of mind; with intent to induce reliance; causing justifiable reliance; that results in damages to the state or a private plaintiff. Action for fraud can be brought criminally or civilly by the state or civilly by a private plaintiff, in tort or contract, or in other specialized instances of fraud, such as in connection with the purchase and sale of securities under Rule 10(b)(5) of the Securities Act of 1933; in connection with the solicitation of proxies under Rule 14(a)(9) of the Securities Exchange Act of 1934; or in various actions for insurance, identity, and other financial frauds. Where fraud is alleged, it must be pled with particularity, such that general allegations of fraud, without sufficient facts, will not survive a motion to dismiss.

Proving Fraud

Though easy to allege, proving fraud is challenging, as it requires proving underlying elements that support a claim for fraud. First, a party alleging fraud must prove the representation amounted to a misrepresentation of material fact. A representation is a misrepresentation when it asserts that something is a particular way when the defendant knows it is not. This can be evidenced by specific actions to mislead, to cover up the truth, or to impede the ability to discover the truth; through a failure to disclose where the law recognizes a duty to disclose; or through a partial disclosure that is misleading. A misrepresentation is material when a reasonably prudent person would consider it important when making a decision or where the defendant has reason to know that this particular plaintiff would consider it important when making a decision. A material misrepresentation concerns a matter of fact when it is not opinion and it can be proven as true or false through use of objective facts.

Second, a party alleging fraud must prove the misrepresentation was intentionally or recklessly made. A misrepresentation is intentionally made when it is communicated for the purpose of deceiving, and is recklessly made when it is communicated with reckless disregard for its truth or falsity.

Third, a party alleging fraud must prove the misrepresentation was committed with intent to induce the plaintiff's reliance. Intent to induce reliance is shown through direct misrepresentation of facts that support an inference of intent to defraud or through indirect evidence of intent to defraud, where the plaintiff is within the expected affected class of persons expected to rely on the misrepresentation at the time it was made.

Fourth, a party alleging fraud must prove they relied on the misrepresentation, and that reliance was justifiable under the circumstances. Where facts would put reasonably prudent persons on notice that they are being deceived, the law imposes a duty to investigate before relying. Where facts do not exist, the plaintiff may rely on an apparently reliable statement without incurring a duty to investigate. In proving that reliance on the misrepresentation was justified, the plaintiff must show that a reasonably prudent person in the same or similar situation would have relied. Where the defendant preys on known vulnerabilities, the requirement may not apply. Where the plaintiff is a professional or possesses special knowledge or experience applicable to the subject matter being misrepresented, justifiable reliance will be judged from the perspective of a reasonably prudent professional with the same or similar qualifications. Additionally, where the defendant possesses knowledge unavailable to the plaintiff, where certain relationships of trust apply; where the defendant has special expertise, or where the defendant has an interest in the transaction under claim of independent authority, the law provides certain presumptions to aid in proving justifiable reliance.

Fifth, parties alleging fraud must prove they suffered damages as a result of misrepresentation by the defendant. Recoverable damages include pure economic loss, damages that flow from the sequence of events set in motion by the misrepresentation, and punitive damages. Recovery for pure economic loss consists of either out-of-pocket expenses, determined by subtracting the value received from the value parted with, or the benefit of the bargain, determined by subtracting the value received from what was promised. The jurisdiction will determine the appropriate theory for pure economic loss. Recovery for damages that naturally flow from the misrepresentation consist of damages attributable to and flowing from the misrepresentation, provided they are not too attenuated to preclude recovery. Punitive damages are also recoverable in an action for fraud but are generally limited to egregious instances that shock the conscience. Where a party prevails on the elements of fraud, there is criminal or civil liability, unless the defendant can defeat it for procedure or raise an appropriate affirmative defense.

Where a party alleges fraud, it must be pled with particularity in the pleadings, or the defendant will defeat it for lack of sufficient facts. When brought without sufficient facts, the defendant will motion for dismissal under Rule 9(b) of the Federal Rules of Civil Procedure, or under the state counterpart where applicable. To survive a challenge under Rule 9(b), a pleading must state with particularity the circumstances amounting to fraud, raising sufficient facts to show that a case for fraud exists. The defendant will also raise evidentiary challenges through pretrial motions to dismiss and/or through evidentiary objections in open court, in an effort to undermine the elements of the claim.

When the plaintiff prevails on procedural and evidentiary matters, the defendant may plead the plaintiff's assumption of the risk as an affirmative defense to liability for fraud. In raising assumption of the risk, the defendant invokes a theory that recovery is precluded, based on the plaintiff's subjective appreciation of the risk and voluntary assumption of it. Where successfully raised, assumption of the risk is a complete defense to recovery, even where the plaintiff prevails on the elements of fraud.

Crisis Management and Vulnerability to Fraud

In the crisis management context, the complexity of response and recovery operations makes efforts especially vulnerable to fraud by claimants, responders, and administering officers alike. Because of competing interests in expediting response and recovery efforts and mitigating the extent and impact of fraud, the inevitable clash of expediting disaster assistance and using comprehensive checks to curtail vulnerability to fraud makes response and recovery ideally suited to fraud. The effect is best seen in numerous accounts of fraud by claimants seeking disaster assistance, responders purporting to provide disaster assistance, and administrators diverting funds to personal interests. When left unchecked in the absence of systematic checks to identify fraud, unwarranted assistance will be paid, funds will be lost, and the efficiency of response and recovery will suffer.

Given vulnerability to fraud in response and recovery, vulnerability can be mitigated by building in systematic checks to identify and address fraud in all aspects of mitigation, preparedness, response, and recovery. By routing claims through independent auditors, utilizing comprehensive supervision of disaster assistance requests, and building accountability into the payment and use of funds paid and materials provided, the risk of fraud can be substantially mitigated in pursuit of effective response and recovery. The preparedness phase is uniquely suited for building antifraud measures into response and recovery ahead of need. Additionally, the risk of fraud can be substantially mitigated by aggressive prosecution for fraud, both individually and collectively, on the heels of response and recovery. Although claims for civil recovery for fraud may be unsuccessful because of the reality that funds paid are often funds spent, criminal prosecution for fraud can be the most effective deterrent of frauds to come.

In the absence of systematic checks to identify, protect against, and prosecute fraudulent claims, fraud can significantly increase the cost and complexity of response and recovery. The federal response to Hurricane Katrina, which was plagued by rampant fraud in claims for disaster assistance through the Federal Emergency Management Agency (FEMA), is especially illustrative. However, by building systematic checks into place to identify fraud, protect against it, and prosecute claims on the heels of loss, vulnerability

A survivor of Hurricane Irene in Lambertville, New Jersey, appears hesitant to speak to Patricia Selby (right), a Federal Emergency Management Agency community relations specialist visiting her home on September 15, 2011, because homeowners are especially vulnerable to fraud in areas struck by disasters. The inevitable tension between expediting recovery efforts and ensuring the legitimate use of resources makes response and recovery ideally suited to fraud, such as false disaster claims, unauthorized responders, and stolen funds.

to fraud can be substantially reduced in pursuit of more effective response and recovery.

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See Also: Bankruptcy, Corporate; Bureaucracy; Business Impact Analysis; Cyber Crime; Debt Crisis; Department of Homeland Security (DHS); Information Asymmetry; Information Vacuums; Insurance; Legal Liability; Losses, Quantitative Versus Qualitative; Product Tampering; Recovery; Reputational Risk; Resource Management; Sabotage; Structural Secrecy; Whistle Blowers.

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Freshwater Demands and Shortages

Water covers about 70 percent of Earth's surface, and its interaction with the radiation from the sun is a major driver of climate events and the hydrological cycle, which continually recycles freshwater through evapotranspiration, condensation, and precipitation. Roughly 332,500,000 cubic miles of water are present in the oceans, land surface, and atmosphere—an amount that, for all practical purposes, can be considered constant. Of the total amount of water on Earth, only about 2.5 percent is freshwater. Generally characterized by having low concentration of dissolved salts and other total dissolved solids, freshwater is a naturally occurring resource and manifests on the Earth's surface. Rivers and lakes, the major source of humans' daily water for consumption and irrigation, constitutes approximately 22,300 cubic miles, approximately 0.007 percent of total water. Studies have shown that the oceans, seas, lakes, and rivers provide nearly 90 percent of the moisture in our atmosphere via evaporation, with the remaining 10 percent contributed by plant transpiration. One estimate of the volume of water in the atmosphere at any one time is about 3,100 cubic miles.

There is a constant amount of freshwater available, unevenly distributed across the planet (Table 1). Natural changes in the Earth's surface through history have dramatically changed the climate system many times, favoring water availability for some places more than others. In the present, Brazil, Canada, and Russia are the countries with the highest water availability and thus water security. The largest known aquifer in the world, Guarani Aquifer, sits underneath Brazil, Paraguay, Uruguay, and Argentina. The Guarani Aquifer coincides with the largest rainforest in the world, the Amazon forest, which experienced heavy deforestation between 1990 and 2004. Such practices alter the land cover characteristics, generating excessive runoff that erodes the soil surface, and substitute natural nutrient-replenishing processes with chemical fertilizers that damage the land and threaten the underlying water body's integrity and capacity.

The Earth's climate system is intrinsically related to the hydrological cycle; in fact, they are one and the same. Light from the sun travels through space until it reaches Earth; the atmosphere scatters or absorbs a portion of the energy and the rest makes it to the surface, then gets absorbed or reflected in different ratios depending on the surface properties. Oceans, which cover approximately 70 percent of the Earth's surface, absorb more radiation than land but have a faster heat exchange rate. The differences in reflectivity and energy-exchange properties of the land, ocean, and atmosphere create a potential difference that drives convective currents that stir the atmosphere and create winds that move clouds full of freshwater, naturally desalinated through evaporation with the energy absorbed by the oceans from the sun, inland, and when the right conditions are met, clouds pour out their content in the form of precipitation or snow. Snow piles up, storing freshwater in the form of glaciers, predominantly on high-latitude lands and elevated peaks. Rainwater falls on the surface and is absorbed by the soil, creating underground streams through porous strata. After complete saturation of the soil, water flows through the surface and accumulates in depressions, forming surface water bodies like lakes and ponds. Plants and animals benefit greatly from surface water bodies being such natural storage features—this is where most of their freshwater is withdrawn. Water flows slowly carve channels that connect inland water bodies to the ocean, closing the cycle where it began.

Technological advances in the 20th century were possible thanks to the burning of fossil fuels. Coal, natural gas, and petroleum are what remain of decomposed organic matter from millions of years ago, trapped between layers of soil at high pressures. When released from deep within the ground and burned, they produce energy, carbon dioxide, and water vapor. Energy is used to power most everyday tools and appliances, lights cities at night, and enables transportation, mass manufacturing, and construction of infrastructure. The major issues with the combustion of fossil fuels lie in carbon dioxide emissions, which, scientists all over the world agree, are unquestionably changing the chemistry of the planet's atmosphere. The effect of a changing atmosphere composition alters the Earth's energy budget and climate system. Changes in the climate system manifest themselves in local weather generally as geographical and seasonal displacement in the normal local climate. Droughts for regularly wet regions, shrinkage of mountain glaciers, an increased melting rate in Greenland and polar ice caps, stronger hurricanes off season, and a staggering number of species in danger of extinction are evidence of a dramatic change with the potential to threaten human life.

Limited availability of freshwater, increasing population growth and industrialization, excessive pollution from anthropogenic emissions, and poor management of water resources and land use of watersheds has created a world freshwater crisis. In 2002, 1.1 billion people had no access to safe water supplies and 2.4 billion had no sewer or sanitation facilities. The total population of the world in 2002 was 6.2 billion. Human deaths associated with lack of clean drinking water are estimated in millions per year. Likewise, biodiversity is being threatened. Estimates suggest that 10,000–20,000 freshwater species are extinct or at risk and more than half of the world's wetlands have disappeared.

Meeting Demand

In general, agriculture consumes most of the available water, followed by the industrial and domestic sectors. It is estimated that 69 percent of worldwide water use is for irrigation, with 15 to 35 percent of irrigation withdrawals being unsustainable. It takes around 792 gallons (3,000 liters) of water, converted from liquid to vapor, to produce enough food to satisfy one person's daily dietary need. Automated irrigation systems provide the water that crops need to grow. Excess water mixes with the chemicals used and percolates through the ground, contaminating underground bodies of water and drying the soil. Eventually, soil erosion decreases productivity until agriculture is no longer feasible.

Water consumption by the industrial sector is estimated to be around 22 percent worldwide. All industrial processes require water at some point for production of goods, cooling processes, and sanitation purposes. Major industrial users include power plants, which use water for cooling; refineries, which use water in chemical processes; and manufacturing plants, which use water as a solvent. For example, the construction industry requires extensive use of clean water when building concrete structures. Concrete is a mixture of cement, aggregate, and water mixed together in different ratios, depending on desired resistance properties of the element bearing the load. Impurities in water used, especially organic material, can affect negatively the resistance of the element. Water withdrawal can be very high for certain industries, but consumption is generally much lower than that of agriculture.

It is estimated that 8 percent of worldwide water use is for household purposes. These include drinking water, bathing, cooking, sanitation, and gardening. Basic household water requirements have been estimated at around 13 gallons per person per day, excluding water for gardens.

To meet demand, governments around the world had subsidized approximately 45,000 dams over 15 meters high by 2010. Dams are massive

Table 1 Total renewable freshwater supply by country

Region	Maximum annual renewable water resources (km³/yr.)	Country	Minimum annual renewable water resources (km³/yr.)	Country	Total (km³/yr.)
Africa	1,283	Congo, Democratic Republic (formerly Zaire)	.03	Cape Verde, Djibouti	5,580
North and Central America	3,300	Canada	0.02	St. Kitts and Nevis	7,621
South America	8,233	Brazil	122.00	Suriname	17,140
Asia	2,838	Indonesia	0.02	Kuwait	14,710
Europe	389	Norway	0.07	Malta	2,943
Former Soviet Union	4,498	Russia	7.80	Armenia	5,577
Oceania	801	Papua New Guinea	28.55	Fiji	1,607

Source: U.S. Environmental Protection Agency

hydraulic structures located at a narrow downstream exit out of a watershed. They are used to control the flow of water through a river or stream and to create large artificial reservoirs to provide water for irrigation and human consumption and to avoid flooding of cropland and human settlements. Another benefit of dams is the capability to produce low-emission hydropower. Hoover Dam, constructed in Nevada between 1931 and 1936 during the Great Depression, blocks the Colorado River and is capable of producing 4.2 billion KWh of electricity to supply Nevada and California. Unfortunately, dams also effectively destroy the surrounding ecosystem and regional water distribution. Low flow velocities in the reservoir are generally regarded as negligible for all practical reasons and are related to low dissolved oxygen levels in the still water. Decreasing oxygen levels in water reduce life expectancy of aquatic organisms, affecting the food chain.

Water demand already exceeds supply in many parts of the world, and as the population continues to rise, so does the water demand. Changes in water demand are intrinsically related to freshwater availability, population density, and economic power. Freshwater is viewed as a commodity in many parts of the planet. Because of failure to account for environmental impacts effectively, building huge infrastructure to control water becomes highly economically feasible.

Associated Shortages

The total quantity of water into any surface water system at any given time and the proportion of water lost are dependent on many factors, such as precipitation within its watershed; storage capacity in lakes, wetlands, and artificial reservoirs; the permeability of the soil beneath these storage bodies; the runoff characteristics of the land in the watershed; the timing of the precipitation; and local evaporation rates. Because of human intervention, the world's supply of freshwater, thought to be a renewable resource, is steadily decreasing. Pollution and mismanagement of resources faster than the natural cycle can replenish them have forced some ecosystems to change drastically.

The Aral Sea is an example of one of the world's worst environmental disasters. Located within the former Soviet Union, the Aral Sea was the fourth-largest lake on the planet, covering an area of approximately 26,300 square miles. From the 1960s, the rivers that fed the Aral Sea were diverted by Soviet irrigation projects, mainly to produce cotton. Reduced water input to the system gradually shrank the lake, changing the local microclimate and increasing temperatures

Table 2 Number of dams by region

Continent/country	Number of dams
Africa	1,269
Europe	4,277
South America	979
Central/Eastern Europe	1,203
North/Central America and the Caribbean	8,010
Asia and the Middle East	31,340
Oceania	577
Earth	47,655

and evaporation rates. As a result, the Aral Sea divided into two separate lakes, north and south. In 2005, the south lake was surveyed, and its area was calculated at 1,350 square miles. The north side area measured 1,270 square miles in 2008. Other than the environmental cost of losing 90 percent of the lake's surface area, transportation routes were lost and economic debacle followed.

Although a dam was built and completed in 2005 and water levels have risen 79 feet, in reference to lowest levels in 2007, the possibility of returning the Aral Sea to its original state is uncertain. The hydrological cycle will eventually replenish the lake, but the process is a slow one and changes in the surface properties and regional microclimate have the potential to alter the system's capacity to store water. Pollution and mismanagement of land and water resources threaten an already limited supply of freshwater. Growing populations and improving lifestyles in developing countries increase competition for water worldwide. At the same time, human-induced climate change disrupts typical weather patterns, offsetting seasonal variations in temperature and precipitation distribution. These factors add up to produce a net global decrease or shortage in freshwater availability.

Water Rights

Energy production, agriculture, manufacturing, and most services are all activities that require massive amounts of water. Most of the time, water being used in such processes is freshwater that ends up contaminated and dumped irresponsibly because of flexible environmental law. Sources for contamination may be thermal, chemical, or biological, altering the water's composition, causing an adverse effect on nearby ecosystems and introducing harmful pollutants into the food chain. To prevent such degradation of water bodies, mainly individual countries regulate water. In addition, international sets of rules have been proposed to safeguard this precious resource. The Helsinki Rules on the Uses of the Waters of International Rivers and the Hague Declaration on Water Security in the 21st Century are examples of such international regulations.

Water law is controversial in some parts of the world where a growing population faces increasing competition over a limited natural supply. Disputes over control of freshwater supply have taken place in many countries around the globe, many escalating to violence and bloodshed. One of the most notorious water wars in history took place in the state of California. As Los Angeles grew in the late 1800s, it started to outgrow its water supply. The city decided to outsource its water demand to Owens Lake, 223 miles away in eastern California. A couple of years after the construction of the aqueduct, the lake's water level lowered and started making agriculture difficult for surrounding farmers. This led to the farmers trying to destroy the aqueduct in 1924. Eventually, Los Angeles prevailed and kept the water flowing. By 1926, Owens Lake at the bottom of Owens Valley was completely dry because of water diversion. By 1928, Los Angeles owned 90 percent of the water in Owens Valley. Agriculture in the valley was effectively dead.

In the United States, the Clean Water Act (CWA) of 1972 is the primary federal law governing water pollution. The law establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the CWA, the U.S. Environmental Protection Agency (EPA) has implemented pollution control programs, such as setting wastewater standards for industry. Many developed countries have adopted similar regulatory laws to protect and conserve their water systems.

Because it is expensive to implement environmental laws, underdeveloped nations many times lack the resources to effectively protect their water systems. Lack of environmental regulations, cheap labor, lower taxes for companies, and abundant natural resources in poor nations attract foreign investments seeking lower operational costs and higher profits. Goods are manufactured using local resources to be later exported to consuming nations. Water is privatized and consumed irresponsibly, leaving poor countries through trade in the global market.

Given the fact that water access is a cross-border source of concern and potential conflict in the Middle East, the eastern Mediterranean, and parts of North America, among other places, some nongovernmental organizations (NGOs) and scholars argue that the right to water also has a transnational or extraterritorial aspect. They argue that given the fact that water supplies naturally overlap borders, states also have a legal obligation not to act in a way that might have a negative effect on the enjoyment of human rights in other states.

In 2002, the right to water was recognized through the International Covenant on Economic, Social and Cultural Rights (ICESCR). The committee of experts agreed on the fact that "The human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses. An adequate amount of safe water is necessary to prevent death from dehydration, to reduce the risk of water-related disease and to provide for consumption, cooking, personal and domestic hygienic requirements." Following its publication, several European nations agreed and formally acknowledged the right to water to be part of their treaty obligations under the ICESCR. Eventually, in 2010, the UN Human Rights Council adopted a resolution recognizing that the human right to water and sanitation are a part of the right to an adequate standard of living.

A water distribution point in El Mina, about a mile west of the town center of Nouakchott, Mauritania, October 2010. UNICEF Mauritania works to increase the supply of household drinking water and stabilize water prices at affordable levels.

Water Crisis

The International Water Management Institute (IWMI) in 2007 conducted a study to see if the world had sufficient water to provide food for its growing population. It assessed the current availability of water for agriculture on a global scale and mapped locations suffering from water scarcity. It found that a fifth of the world's people—more than 1.2 billion—live in areas of physical water scarcity, where there is not enough water to meet all demands. One-third of the world's population does not have access to clean drinking water, which is more than 2.3 billion people. A further 1.6 billion people live in areas experiencing economic water scarcity, where the lack of investment in water or insufficient human capacity makes it impossible for authorities to satisfy the demand for water. To avoid a global water crisis, farmers will have to strive to increase productivity to meet growing demands for food, while industry and cities find ways to use water more efficiently. It has been proposed that when annual per capita renewable freshwater availability is less than 1,700 cubic meters, countries begin to experience periodic or regular water stress. Below 1,000 cubic meters, water scarcity begins to hamper economic development and human health and well-being.

Considering also the current energy limitations, most countries rely only on their surface water and groundwater resources, which are exploited at a faster rate than the system can replenish. Energy demand for pumping water rises as fuel prices go up because of conflicts in oil-producing countries and shortening of supply. As the world supply of oil reaches a peak, trying to keep up with increasing energy demand, energy-dependent water supplies will have to be managed, their increased cost increasing fares, directly affecting consumption by low-income families.

Currently, new technologies are being developed to counteract water shortages. One of them is desalination, which is currently expensive compared to most alternative sources of water. Nevertheless, desalination plants have been used extensively in Persian Gulf countries rich in oil.

Coping with water crisis is a global endeavor. Planning urbanization to sustain geographically expanding populations and booming economies in a sustainable manner needs to be seriously considered if the right to water for all is the goal. Reducing demand through more efficient use, protection, and conservation of water resources is considered by many as the responsible and most cost-effective way to ensure water security. In agriculture, the use of high-efficiency irrigation techniques, use of plastic liners in irrigation canals to prevent leaks, level fields to reduce runoff, choosing crops appropriate for the climate, and eliminating government subsidies of inappropriate crops or methods can greatly reduce the sector's water demand. Individuals can also reduce their water footprint by installing low-flow faucets and appliances, replacing lawns with native vegetation, or watering their lawns at night to reduce water loss resulting from the higher daytime evaporation rate. Industry and municipalities can shift to processes that save water, invest in repairing pipe leaks, and recycle "gray" wastewater. Governments can adopt economic approaches to conserve water by stopping government subsidies and inefficient practices, setting water price standards that reflect environmental costs, and decentralizing control over water.

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See Also: Climate Change Adaptation; Deforestation; Drought; Environmental Contamination; Famine; Floods; Food Security; Global Food Crisis; Global Warming; Overpopulation; Refugees and Forced Migration Sustainability; World Water Relief.

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Fusion Center

Fusion centers are sometimes described as intelligence or information sharing centers. A fusion center is a key mechanism designed to exchange information and intelligence at the local, state, and federal levels. A fusion center is not a monitoring or operational center, nor does it respond to 911 calls or other direct interactions with the public. Instead, it is a physical location for information analysis. The main role of a fusion center is information collaboration and coordination of the fusion process in order to alert law enforcement agencies concerning threats and criminal activities prior to an actual event. The structure of fusion centers allows all levels of law enforcement agencies to use an improved information or intelligence sharing and dissemination system that maximizes the prevention, protection, and response capabilities of law enforcement agencies throughout the country.

Development of Fusion Centers

The development of the fusion center movement began with socioeconomic and technological changes in the United States during the 1960s and 1970s. New conjunctures and improvements had forced law enforcement agencies to carry out new approaches and solutions in pursuit of improved service. Some law enforcement agencies accordingly established local information sharing system units that have operated for decades. However, the tragic terrorist attacks on September 11, 2011, showed that there was a critical gap in information and intelligence sharing among all levels of law enforcement agencies throughout the country. This crisis highlighted a crucial need to refocus information sharing strategies in terms of a unified and collaborative operative response to acts of terrorism, and accordingly the need for a formalized information repository and sharing center.

Following September 11, the term *fusion* has come out of a new concept defined as a facilitating and embracing process for information sharing and intelligence through all levels of government agencies, as well as the public and private sectors. The expansion of this new fusion center philosophy has provided a more cooperative approach to law enforcement agencies within the United States. Fusion centers have been established, organized, and managed by state and local entities within their respective missions. The Department of Homeland Security (DHS) has supported the fusion center movement, providing training, grants, and staff. Specifically, after Congress passed the 9/11 Commission Act in 2007, fusion centers have been promised to be developed by DHS, becoming an important component of homeland security strategy within the United States.

Fusion Process and Function

The fusion process represents a new intelligence function among local, state, and federal law enforcement agencies. Data fusion is a technique that exchanges and combines information and intelligence from multiple sources in order to improve accuracy. It is expected that an individual or user will turn raw information into more comprehendible and usable knowledge by analyzing and putting together the small parts that enable agencies to see a more comprehensive picture of crime, security, and terrorism issues. Thus, this collaborative effort prevents disorganization, duplication of effort by multiple agencies, and agencies working at cross-purposes.

The fundamental purpose of creating fusion centers is to combine multiple information- and intelligence-gathering services into a single center that provides a unique portal for analysis. This collaborative effort maximizes agencies' abilities to respond to terrorist threats and other criminal activities by analyzing data from various sources. This improved and proactive information is disseminated among federal government agencies and their state, local, and tribal counterparts, representing an advanced information flow between local entities and federal authorities.

Contrary to similar agencies organized pre-9/11, such as the Regional Intelligence Center (RIC) and the High-Intensity Drug Trafficking Area (HIDTA), whose purpose was to identify and prevent drug traffickers in their efforts, these new-generation fusion centers provide a broad range of data to law enforcement agencies. The function of a fusion center allows government, public safety, and private sectors to come together for a common goal that enhances information and intelligence sharing. Local, tribal, state, and federal law enforcement agencies play an active role in accumulating information during the fusion process. Non–law enforcement agencies, such as private-sector organizations and public safety entities, are also rich intelligence sources that provide significant information, such as suspicious activity reports. The information provided by non–law enforcement agencies is therefore also an important component in obtaining meaningful and actionable information for analysis by law enforcement personnel.

Ideally, fusion centers consist of representatives who are analysts performing strategic duties from different local, state, and federal law enforcement agencies. Each agency representative is responsible for detecting and preventing threats and criminal attempts by analyzing and evaluating information. Representatives also determine what type of information is needed by these agencies. Received information such as incident reports from local police officers or first responders, intelligence reports from various agencies, and reports of suspicious activities from public safety organizations are collected within the system. Following the fusion process, analyzed reports are disseminated to related agencies as intelligence assessments, alerts, bulletins, and strategic reports. An improved situational awareness is provided throughout the country, and these consolidated reports allow law enforcement agencies to see trends and patterns in the "big picture" related to homeland security issues.

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See Also: Crisis Communications; Department of Homeland Security (DHS); Emergency Alert Systems; Emergency Management, Principles of; Emergency Management System; Emergency Operations Center; Information Vacuums; Operational Plans; Prevention; Situational Analysis; State Emergency Management Agencies; Strategic Plans; Warning.

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Global Food Crisis

The phenomenon of a global food crisis, marked by simultaneous disruptions to food accessibility in multiple regions globally, is a relatively recent event.

Local Risk, Local Response

The potential for food shortage is an inherent risk in any agricultural system given the unpredictable impact of weather, crop success, political dynamics, and other factors. These local roots have made famines largely local affairs for most of history. The Great Famine of 1847, for example, was largely limited to Ireland, and the famine associated with Chairman Mao's Great Leap Forward in the 1950s affected Chinese peasants.

The localized nature of these crises was reflected in the first wave of policy responses. The United Nations formed the World Food Programme (WFP) in 1961, with a mandate to provide food both during and in the immediate aftermath of emergencies. The organization is the only unit working under the umbrella of the United Nations with this as its sole objective. The WFP relies for its work on a combination of donated cash and food from governments as well as a network of thousands of employees and contractors, 90 percent of whom work in the field rather than at the agency's Rome headquarters.

The work of the WFP complements that of its older sibling, the Food and Agriculture Organization of the United Nations (FAO). Whereas the WFP was created to address immediate humanitarian concerns, the FAO was organized to promote longer-term food security and nutrition at the local level. The agency has since become a centralized platform for gathering data, sharing agricultural research, and dispersing expertise and resources into the field in country-level projects around the world.

These efforts bolstered national crisis responses. In many countries of the Southern Hemisphere, the state-led development paradigm adopted by former colonies in their first decades of independence emphasized self-sufficiency rather than global trade. The resulting policies focused on import substitution through a combination of the nurturing of national champions and welfare policies oriented to the stabilization of local prices and production. During this period, many commodity-producing countries created marketing boards that acted as para-statal organizations that helped support price stability for both farmers and consumers and often combined this role with the creation of strategic grain reserves for emergency response.

The Global Food Crisis From 1972 to 1973

The pattern of generally localized crisis was altered significantly in the early 1970s. The global food crisis of the 1970s had its roots in a global weather pattern that disrupted grain production across the rice-producing countries of southeast Asia in 1972 and later across the wheat- and corn-farming areas of the Northern Hemisphere. The resulting decrease in production significantly reduced global grain availability, leading to an inevitable increase in prices. Rising prices in turn interacted with instability in financial markets following Richard Nixon's decision to take the U.S. dollar off the gold standard and were cited as a factor by the Organization of Petroleum Exporting Countries (OPEC) in support of its 1973 decision to raise oil prices.

Although the initial crisis appeared to end in 1973, in practice many parts of the world were affected through the 1970s because of a combination of global inflation and local weather and other dynamics. The depth of the crisis led the FAO to convene the World Food Conference in 1974 to develop a global policy framework for crisis response and managing food security. Within the FAO, the conference resulted in the creation in 1975 of the Global Information and Early Warning Service (GIEWS), a global network of monitoring and data-gathering efforts targeted at identifying potential emerging crises and providing local information necessary for effective crisis response. The GIEWS remains central to the FAO's work with food insecure countries and is housed within its Emergency Coordination Group.

The conference also led to the creation of the International Fund for Agricultural Development (IFAD) in 1977. The IFAD is an independent agency within the United Nations group, with a mission of eliminating rural poverty by promoting food security and better nutrition. Like its peers the WFP and the FAO, the IFAD has a central bureaucracy but develops and implements programs at the country level.

The World Bank and Agriculture

The World Bank also stepped into the global debate about food policy with its 1982 World Development Report. These annual documents serve to define the Bank's lending agenda for the coming year and are thus used as a barometer of the Bank's priorities. The 1982 report included the Bank's response to the global recession that began in 1981 as well as its proposals for the role of agriculture in development. The document signaled a commitment to funding agricultural research as well as a commitment to promoting market-centric policies that later became known as the "Washington consensus."

These policies had a direct impact on many of the less-developed countries that relied on World Bank funding, especially those in Africa. In many cases, the Bank's preference for private-sector solutions led to reductions in the role of marketing boards as well as reductions in government subsidies for seed, fertilizer, and other inputs, all under the assumption that global prices would provide better signals to guide production in the absence of local distortions. Simultaneously, the bank neglected to follow through on its funding commitments for agricultural research, which fell from 16 percent of aid to African countries in 1982 to 4 percent in 2006. This decline was echoed by a widespread lack of foreign direct investment from the private sector. The end result was a steep decline in agricultural output in Africa from the early 1980s to the middle of the 2000s, leaving many on the continent significantly exposed to global commodity prices.

The Crisis of 2007

Unlike the 1972–73 crisis, the rapid onset of the food crisis that began in 2007 was not marked by significant declines in production (though poor wheat harvests in 2007 did play a role). Although global grain stocks relative to use had been declining steadily since the late 1990s, leading to a steady increase in nominal prices, the rate of decline did not accelerate commensurately with the sudden spike in food prices. Although precise attribution remains a point of contention, a consensus in the literature has developed around a "perfect storm" combination of a range of factors, including the increasing diversion of food crops to biofuel, rising oil prices (which increase both fertilizer and transportation costs), and the declining U.S. dollar. In the case of rice, many Asian countries reacted to potential disruptions to the staple food by enacting emergency policies ranging from export bans in rice-producing countries such as Thailand and massive purchases by importing countries seeking to secure supply. Perhaps the most controversial claim about the crisis involves the role of financial speculators, whose involvement with first the oil and later the wheat futures markets was found by the U.S. Senate to have contributed to price spikes in each case. Estimates by the World Bank and other agencies found that as many as 100 million people globally were pushed into poverty by the resulting crisis.

Given the severity and duration of the global crisis that began in 2007, both the traditional food security agencies as well as new entrants have begun to blend work on crisis response with preventive measures to lower global vulnerability to food price instability in the future. This blend was reflected in the approach of the World Bank, which made agriculture the central topic of its 2008 World Development Report (titled "Agriculture for Development") for the first time since the 1982 report. It also introduced its Global Food Crisis Response Program (GFRP) in that year. The program brings together the Bank's capabilities for emergency lending and grants for food relief under one umbrella organization. Importantly, the program combines this capability with a commitment to making investments in agricultural research in order to build food security capacity at the country level. The GFRP budget was raised to $2 billion in 2009 and has remained at that level following the second spike in food prices in 2010.

The various elements of the United Nations system that work in areas touching on food security have also moved toward a more explicit emphasis on the blend of crisis response and longer-term development. Members of the system have undertaken a number of planning meetings since 2008 geared toward producing greater cooperation across agencies. Among the more concrete outcomes of these meetings is a set of guidelines issued in 2009 intended to guide more structured collaboration between the FAO, the IFAD, and the WFP in order to take advantage of their global resources and complementary expertise.

The food crisis has also prompted a response from the private sector, particularly from the Bill and Melinda Gates Foundation, which has made investments in global food security one of its top priorities. The foundation's mission includes three primary programs, of which Global Development is the second largest (after its more widely publicized Global Health efforts). In 2010 alone, the foundation made $242 million in grants for global agriculture, focused largely on boosting the ability of smallhold farmers to access markets, boost yields, and support local food security.

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See Also: Commodity Shortages; Crisis, Definition of; Drought; Food and Agriculture Organization of the United Nations (FAO); Food Security.

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Global Warming

Global warming is one of the environmental crises of the 21st century. Global warming refers to the rising of the average temperature of the Earth's atmosphere. The origin of global warming dates back to 1896, when Svante Arrhenius, a Swedish chemist, developed the theory that burning of fossil fuels such as coal, oil, and natural gas emits carbon dioxides, which produce excess heat that is trapped in Earth's atmosphere, causing a rise in global temperature. Arrhenius explained his theory of global warming by the process of the "greenhouse effect," which was first observed and posited by Joseph Fourier in 1824. This article explains the concept of global warming, and its origin, causes, effects, and trends. It also describes the vulnerable groups, the responses to global warming, and measures to curb it. Global warming is expected to bring developmental, human, and environmental crises. The theme is more relevant in the context of crisis management.

Causes of Global Warming

Earth's atmospheric temperature rise results from increasing concentration of greenhouse gases (GHGs) such as water vapor, carbon dioxide, methane, ozone, nitrous oxides, and chlorofluorocarbons (CFCs). The greenhouse gases are produced mainly by human (anthropogenic) activities such as burning of fossil fuels, deforestation, and transportation. Fossil fuels dominate the global energy regime and account for over 85 percent of the total global energy consumption.

There is scientific consensus that the global warming is the result of human-induced GHGs emissions. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) estimates that carbon dioxides from fossil fuel burning account for about 57 percent, and another 17 percent result from deforestation and biomass decay and together with other sources, carbon dioxides account for about 77 percent of the total GHG emissions. The other major greenhouse gasses are methane (14 percent), nitrous oxides (8 percent), and other gases (1 percent). Rapid industrialization, urbanization, and the increase in number of vehicles on the roads have contributed substantially to carbon dioxide emissions. Methane, the second potential GHG, is released from landfills and rice fields when bacteria break down organic matters. Clathrates—the frozen ice masses—are also sources of methane that lie at the bottom of the Arctic sea beds. Methane is released when ice melts as a result of the rise of temperature of ocean water. Nitrous oxide is released from chemical fertilizers, pesticides, and gases used in various industrial processes. Different greenhouse gases have different heat-trapping potentials. Methane has 20 times more warming effects than carbon dioxide. Nitrous oxide has 300 times more warming potential than carbon dioxide.

Disagreements have arisen, however, regarding the nature, causes, and consequences of global warming. Some scientists disagree that the causes of global warming are based in human factors, and they argue that it is the result of natural fluctuations in the Earth's temperature and changing climate system cycle. Others view global warming as caused by variability in solar radiation and they argue that the temperature increase over the past century is the result of intense solar activity and varying solar radiation. Studies also show that fossil fuels produce air pollutants that make the clouds reflect more of the sun's rays back into space by a phenomenon known as "global dimming." Addressing global dimming may cause more global warming, as well as other environmental problems.

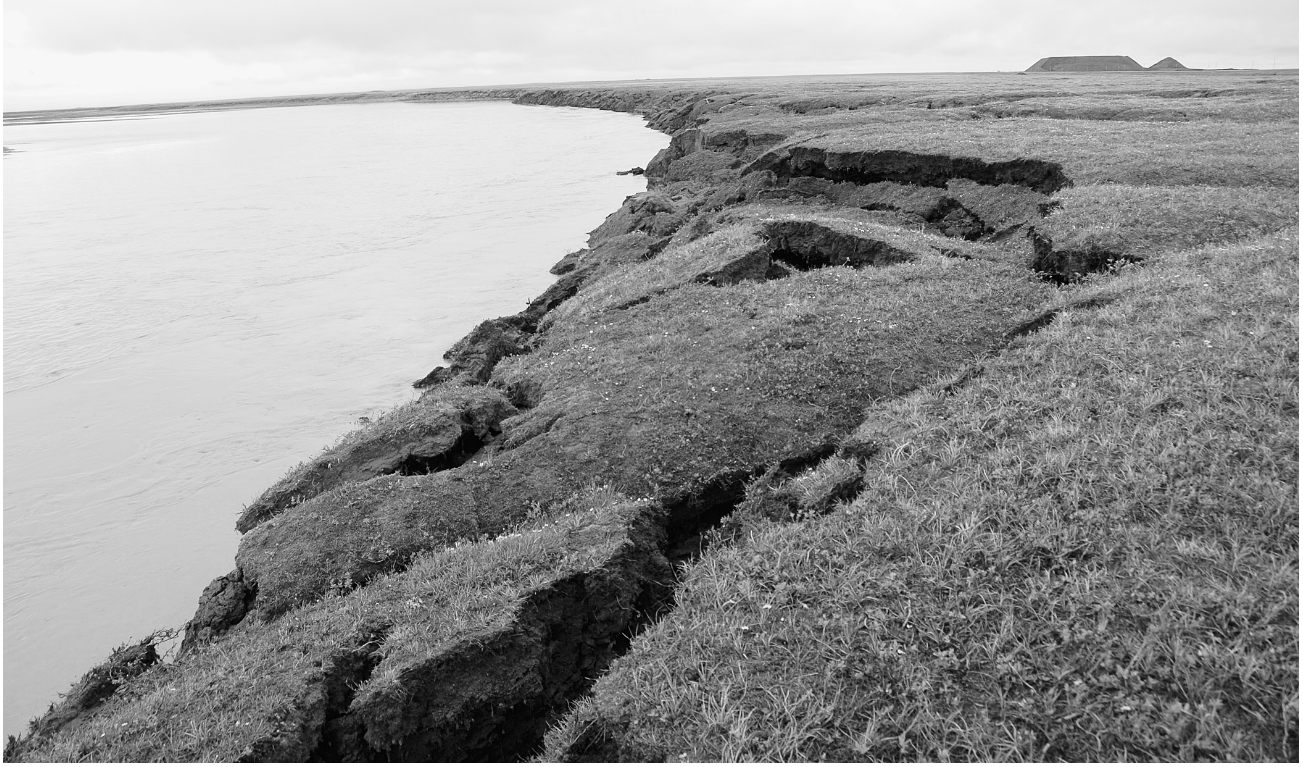
Trends in Global Warming

Scientists view that the global warming trends recorded throughout the 20th century are extreme and atypical. The Fourth Assessment Report of the IPCC indicates the world average temperature has increased by approximately 0.6 degrees C and two-thirds of warming occurred since 1975. Of the 12 warmest years since 1850, 11 were between 1995 and 2006. The IPCC indicates that in the present century, the global surface temperature is likely to rise a minimum of 1.1 to 2.9 degrees C (2.0 to 5.2 degrees F) and to a highest scenario of 2.4 to 6.4 degrees C (4.3 to 11.5 degrees F).

Effects of Global Warming

The global warming is causing melting of ice and other cryospheric changes. Greenland's ice sheets are most vulnerable to global warming. Rising sea level, as a result of thermal expansion of the ocean and melting of ice because of global warming, is inevitable. The IPCC's Fourth Assessment Report estimates that global average sea level has risen since 1961 at an average of 1.8 mm/year and since 1993 at 3.1 mm/year. The report predicts a sea level rise between 0.18 and 0.59 meters by the end of the present century. An increase in global temperature may bring changes in temperature and precipitation patterns that may increase the frequency, duration, and intensity of extreme weather events such as droughts, floods, heat waves, and windstorms. Flooding, the most common event, is predicted to increase in its intensity.

Global warming and consequent sea level rise are expected to cause coastal erosion and loss of biodiversity, severely affecting food security systems, causing problems of malnutrition and hunger, and aggravating already existing environmental and human crises. Human migration and displacement with environmental refugees are expected to increase. Global warming and extreme climate



Large chunks of soil collapse as a result of permafrost thaw and erosion along the Sagavanirktok River on the north slope of Alaska near Deadhorse in July 2009. When permafrost thaws, microbes digest vegetation, which results in the release of methane, a potential greehouse gas that is thought to lead to global warming. Methane can also be released into the atmosphere through another process of thawing: The rise of ocean water temperatures can thaw frozen ice masses at the bottom of Arctic sea beds.

events have potential impacts on water and energy resources, as well as other sectors such as agriculture, forestry, and fisheries. The resulting human and environmental crises, coupled with resource scarcity (food, water, and energy) arising from global warming, may generate political conflicts.

Global warming may cause shifting in temperature regimes, changes in crop yields, and extinction of species. Severe human health problems are likely to occur because of increases in infectious diseases spread by pests and insects. Vector-borne diseases such as malaria, cholera, fileria, and yellow and dengue fevers are expected to rise because of global warming and climate change. Diarrheal diseases associated with floods and droughts are likely to increase. Global warming is expected to put stress on water resources, energy supply, and other economic and ecological systems. Global warming is likely to affect certain ecosystems more than others, for example, tundra, mangroves, and coral reefs. Species and their habitats are decreasing, and the chances of ecosystems to adapt naturally and conditions of equilibrium are also diminishing. Rising temperatures may increase evaporation and water loss, causing reductions in water supplies, leading to water crisis. Nearly 1.8 billion people could be living in water-scarce environments by 2080. The consensus among many scientists is that human-induced global warming will dramatically increase extreme weather conditions that will destabilize the economy and the environment. Growing intensity of climate change events such as hurricanes, floods, and droughts is expected to seriously undermine development.

The ocean is a huge "carbon sink," holding about 50 times as much carbon as the atmosphere. The carbon sink potential of the ocean, however, is diminishing because of global warming. As a result of increased thermal stratification of oceans, there have been substantial reductions in phytoplankton, which store carbon dioxides. Increased atmospheric carbon dioxide is also causing an acidification of the ocean, affecting marine organisms, especially the shell-forming organisms. Studies suggests that the amount of oxygen dissolved in the oceans may decline by global warming, with an adverse impact on marine life. Scientists, however, argue several positive impacts of global warming, for example, a longer growing season, higher-yield harvests and increased food production, better human health, and a decrease in climate-related disasters. Although global warming is a major threat to coral reefs, studies reveal that some coral species may be able to adapt to warmer oceans. The impacts of global warming and climate change, however, remain uncertain.

Vulnerable Groups

Vulnerability to global warming and consequent climate change events is expected to increase. Small island states are the most vulnerable group, facing the greatest risks to global warming, sea level rise, coastal flooding, and the other extreme weather events. Sea level rise is expected to exacerbate inundation, storm surge, marine erosion, and other coastal hazards in small island states. Global warming and extreme weather events are likely to reduce water resources in these countries. Children, women, the elderly, and communities living in poverty are particularly the groups most vulnerable to global warming and climate change.

Responses to Global Warming

In 1988, the United Nations Environment Programme and the World Meteorological Organization established the Intergovernmental Panel on Climate Change (IPCC) to assess the scientific knowledge on global warming. The United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty agreed at the Rio Earth Summit in 1992, adopted a range of policies to prevent dangerous human-induced greenhouse gases causing global warming. The Kyoto Protocol to the UNFCCC, adopted in December 1997 and entered into force in February 2005, aimed at reduction of greenhouse gases to combat global warming.

Measures to Curb Global Warming

Global warming and climate change are imminent. Action must be taken to curb further buildup of heat-trapping gases in the atmosphere. There is a need to modernize power plants, reduce dependence on fossil fuels, generate electricity from nonpolluting sources, expand clean energy sources, and increase energy efficiency. All mitigation strategies need to be intensified in reducing the GHG emissions, enhancing the capacity of carbon sinks and for a low carbon development. The strategies of low carbon development can be taken by investing in clean energy sources and promoting "green growth" and "green development." Strict enforcement of environmental legislation and policies is crucial. Intensification of reforestation programs is vital in order to increase the carbon sink capacity of vegetations and reduce production of greenhouse gases.

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See Also: Climate Change Adaptation; Deforestation; Drought; Floods; Food Security; Freshwater Demands and Shortages; Ozone Layer Depletion.

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Groupthink

Reaching consensus, the general agreement among all members of the group, is desirable in many contexts. Consensus should not occur, however, until after careful analysis and consideration of all relevant points of view. Realistically, absolute consensus is rarely achieved and, in some cases, can be catastrophic. The groupthink concept offers a clear characterization of perilous consensus.

In what has become a classic work, psychologist Irving Janis characterized the desperate drive for consensus at any cost as "groupthink." Janis's early work focused mainly on disastrous policy decisions made by groups who counseled United States presidents. Groupthink occurs when members of a decision-making group are so obsessed with reaching consensus that they discount evidence that challenges the prevailing ideas of the group. Scrutiny of the pros and cons of an idea is replaced by a sort of group arrogance that assumes the group will make the best decision without deliberation. Janis believed groupthink was at the source of such historic failures as Pearl Harbor, the Bay of Pigs invasion, and the Vietnam War.

Warning Signs of Groupthink

Janis provides six warning signs of groupthink:

- *Limited discussion:* The group limits discussion to just a few alternatives. These alternatives are usually the most comfortable choices available to the group.
- *Ignoring risk:* The group does not reevaluate its choices, even after new signs of risk become apparent.
- *Ignoring alternatives:* The group does not reevaluate its choices to see if it may have passed over an alternative that could provide even greater benefits.
- *Ignoring advice:* The group does not seek advice from relevant experts within the organization.
- *Limiting focus:* The group seeks facts and opinions that support its decision while ignoring information that does not.
- *Failure to plan for crisis:* The group fails to consider the potential consequences that might exist if its plans fail.

When these warning signs are present, groups are in danger of unequivocally supporting a counterproductive policy despite the availability of known alternatives.

Avoiding Groupthink

To avoid the potential dangers of groupthink, groups should carefully consider if consensus has come at the cost of productive conflict, accuracy, and efficiency. Productive conflict refers to the clash of opinions and the discussion of contradictory evidence. In this case, "clash" refers to healthy disagreement among group members. When a group allows productive clash, group members feel free to speak up if they disagree with a decision or potential decision. Without such productive clash, the group stops functioning as a unit. One or two individuals control the group, thereby negating the primary strength of groups—multiple perspectives. When group members choose to avoid productive clash, the quality of the group's decisions is in jeopardy.

To ensure that adequate clash exists, Carl Mann suggests group members answer four questions as part of their group deliberations:

- Is there enough evidence to warrant the conclusion?
- Is there negative evidence that rebuts the conclusion?
- Does the evidence genuinely support the conclusion?
- Does the conclusion go beyond the supporting materials?

An informed discussion that considers all points of view and carefully considers the quality of evidence available is likely to avoid making the types of seriously flawed policy decisions that continue to precipitate crises.

Recent Applications of Groupthink

More recently, some scholars have argued that groupthink contributed to the space shuttle *Challenger* disaster as well as the U.S intelligence agencies' assessment of Saddam Hussein's weapons of mass destruction efforts. To clarify, communication scholars Dennis Gouran, Randy Hirokawa, and Amy Martz found that managers from Morton Thiokol, a company responsible for producing key components of the space shuttle *Challenger*, initially recommended that the launch be canceled. They wanted to cancel the launch because they feared that the temperature was too low to allow the rockets to function properly. These managers perceived external pressure from the National Aeronautics and Space Administration (NASA) to reverse their decision to delay the launch. This perception by the engineers that they were being pressured to go along with what they believed was the group's consensus is a clear sign of groupthink. Unfortunately, this decision led to the explosion of *Challenger* 71 seconds into the launch. The shuttle exploded for precisely the reason that made the Morton Thiokol managers originally ask that the launch be delayed. Worse, Phillip Tompkins's study focusing on the space shuttle *Columbia* disaster nearly 10 years later found that some of the same group decision problems were still evident in NASA.

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See Also: Decision Making; Decision Making; Theories of; Decision Making Under Stress; Decision Stream; Normalization of Deviance.

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H

Hazard, Definition of

The origin of the English word *hazard* is considered to come from the old French word *hasard*, meaning a game of chance using dice; from the Spanish *azar*; from the Arabic *az-zahr*; from the Persian *zar*; or from the Turkish *zar.* The word indicates something causing danger, peril, risk, or difficulty. Hazard is used both as a noun and as a verb. As a noun, hazard means a game played with two dice, an earlier and more complicated form of craps. It is also used to refer to an obstacle, such as a bunker, sand trap, or the like on a golf course. As a verb, hazard means to offer (e.g., a statement or conjecture) with the possibility of facing criticism, disapproval, failure, or the like. It means to put to the risk of being lost or to expose to risk. Hazard and risk are often confused with regard to their meaning and implications. The term *hazard* has already been explained above; however, the term *risk* is derived from the classical Greek word *Rizikon*, which means root. Hazard has an existing situation, which is likely to cause damage or harm, whereas risk is an anticipated situation of potential harm or danger that can be avoided, prevented, or mitigated.

Definition of Hazard

According to terminology suggested by the United Nations International Strategy for Disaster Reduction (UNISDR) on disaster risk reduction in 2009, a hazard is defined as a dangerous phenomenon, substance, human activity, or condition that may cause loss of life, injury, or other health impacts; property damage; loss of livelihoods and services; social and economic disruption; or environmental damage. Such hazards arise from a variety of geological, meteorological, hydrological, oceanic, biological, and technological sources, sometimes acting in combination. In technical settings, hazards are described quantitatively by the likely frequency of occurrence of different intensities for different areas, as determined from historical data or scientific analysis.

Statistically, hazard is defined as the probability of occurrence of a potentially damaging event, process, activity, or condition of given characteristics in a given space and time. Besides the probability of occurrence, the characteristics of the hazard are described by its physical dimensions, including location, magnitude (mostly defined in terms of energy released), duration of occurrence and impact (the period), geographical extent, frequency (how often it occurs), intensity, timing of occurrence, and speed of onset (how fast or slowly it occurs). Hazard is not deemed to be synonymous with risk, although it is an important determinant of risk. Hazard is actually the potential to cause harm, whereas risk is the likelihood of harm in defined circumstances. The degree of risk depends upon the degree of exposure and vulnerability of the element exposed to a given hazard. A low exposure to something that is highly hazardous may result in a low risk, whereas a high exposure to something of low hazard may result in moderate or even high risk.

A widely accepted definition characterizes natural hazards as "those elements of the physical environment, harmful to human beings and caused by forces extraneous to him/her." The term *natural hazards* refers to all atmospheric, hydrologic, geologic, and wildfire phenomena that, because of their location, severity, and frequency, have the potential to affect humans, structures, and activities adversely. The probability of occurrence of hazards depends on certain causative factors and conditions that can be identified and assessed for disaster risk management. However, such hazard identification and assessment will have some uncertainty, which should be informed while expressing the results. The factors affecting the occurrence of hazards may be inherent or acquired.

Hazards and Human Involvement

The term *hazard* includes an element of human involvement. A physical event, such as an earthquake in the oceans or polar areas, that does not affect human beings is a natural phenomenon but not a hazard. A potentially damaging phenomenon that occurs in a populated region would be termed *probable hazard*. Similarly, a hazardous event that causes an unacceptably huge number of human deaths or colossal damages to economy and environment would be termed a *disaster*. In areas where there are no human interests, natural phenomena do not constitute hazards nor do they result in disasters. This definition is thus at odds with the perception of hazards as unavoidable havoc wreaked by the unrestrained forces of nature. It shifts the attention from natural phenomena or processes to the concurrent presence of human beings and natural events. Earlier, hazards were considered by a school of thought as natural occurrences and "acts of God," but the increasing awareness and understanding of hazards has now led to the view that the problem of hazards cannot be handled without considering humans' relationship with nature and the nature of human society.

When a particular hazard of given characteristics is considered for disaster risk assessment/reduction, it is termed a "specific hazard." In cases when more than two hazards are considered simultaneously in the risk management process, it is termed a "multi-hazard approach."

Cascading Hazards

Hazards may not occur in isolation from each other. Rather, it is quite possible that one hazardous event may trigger another hazardous event, followed by still another. This is termed "cascading hazard." For example, an earthquake in a hilly terrain may cause landslides, which may block the water channels, and the bursting of these landslide-dammed channels leads to flash floods in the area. Thus, a single hazard is likely to have multiple impacts. For instance, an earthquake damages buildings and infrastructures, associated landslides result in loss of land and crops, and the flash floods erode the structures/infrastructure and inundate the affected area.

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See Also: Cascading Crisis; Disaster, Definition of; Hazard Vulnerability Analysis.

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Hazard Mitigation

Hazard mitigation can be broadly defined as measures directed at reducing risk or damage to property and lives from natural or human-made

Drainage tubes installed along Route 30 in Blenheim, New York, diverting water during a heavy rainstorm on November 23, 2011. The tubes were part of mitigation work that was completed after flooding struck the area during Hurricane Irene in August 2011. Hazard mitigation techniques, such as this structural example, can reduce the vulnerability of the property or life exposed to the hazard.

hazards. Suitable mitigation measures are determined by assessing which factors cause the most risk, and which of those will provide the most safety for cost. Hazard risk mitigation techniques can diminish the hazard and reduce the vulnerability of the property or life exposed to the hazard. Hazard mitigation techniques are structural (for example, dykes to protect from floods). Vulnerability mitigation techniques can be structural (for example, raising a home above flood level) and nonstructural (for example, regulation to address behavioral changes among the population with regard to the hazard). Mitigation is generally considered to be the first stage of disaster/crisis management. It allows for building community and personal resilience to hazards prior to the event through long-term investments in safety. This discussion focuses on nonstructural mitigation of natural hazards through incorporation of indigenous knowledge and local land use planning. The case study features the process of collaborative development of a risk-based land use guide for Metro Vancouver, British Columbia, Canada, with a goal of mitigating hazards and strengthening community safety through informed land use decisions.

Humans have been trying to mitigate hazards for centuries. Vincent Covello and Jeryl Mumpower suggested that virtually all great ancient civilizations (e.g., China, Maya, Egypt, and Mesopotamia) directly intervened to mitigate the effects of natural disasters and that governments have played a major role in developing and financing elaborate systems of flood control. Given the growing costs of disasters, public-private partnerships with the goal of mitigating hazards are gaining recognition as a potential way to share risk and costs of long-term investments in the resilience of communities and societies.

Researchers such as David Godschalk and colleagues in the United States and John Handmer

Case Study: Risk-Based Land Use Guide for Hazard Mitigation

Risk-based land use guides provide municipal staff with principles and tools to evaluate and recommend land use decisions that mitigate disasters. To be effective, the guides incorporate principles and tools recognized locally, nationally, and internationally as the most informed of our time (best practices). A land use guide targets municipal staff because they provide both the strategic and operational recommendations and decisions on land use for urban centers. Large urban centers, in general, are the most vulnerable land uses.

In recognition of the magnitude of responsibility that municipal staff carry in building safe communities, a consortium in southwest British Columbia, Canada, formed to assist municipal staff in consolidating informed risk-based land use practice into a practical guide. Its development is predicated on the inclusion of local and scientific informed practice. It is community focused, based on common economy, society (culture, governance), and geography. The southwest British Columbia example was driven by threats posed by its multihazard geography.

Hazard Context

Southwestern British Columbia faces challenges of a rugged mountainous, fiord-style coastal geography driven by tectonic plate convergence causing earthquakes and volcanoes. Prevailing onshore winds deflected by the mountains produce large amounts of precipitation, causing multiseasonal rapid-onset flooding. The volcanic mountains are unstable, being composed primarily of poorly consolidated fine-to-coarse fragments. The other mountains, of granitoids and metamorphosed sedimentary rock, are coated in debris from their own disintegration and material left by the retreat of continental glaciers at the end of the last ice age. These slopes regularly release debris flows and rock slides, often triggered by high rainfall events. The Fraser River, fed from the interior of British Columbia, has caused extensive valley flooding from rapid spring snowmelts. The region remains heavily forested, and fires and blowdowns threaten developments.

Vulnerability Context

Over 2.5 million people live on the Fraser River delta and along its mountain flanks (Metro Vancouver). Tens of thousands more live along fiord edges and the valleys leading north through the mountains (for example, the town of Squamish). The urban built-environments are modern and affluent, developed primarily over the last 100 years as a Pacific port facility, transporting natural resource riches and importing manufactured goods, and being the financial hub of British Columbia. Typical of delta and port cities, it has many bridges and extensive exposure to water from the river and the ocean. Industrial and port facilities and railways were built on land created by filling shallow coastal waters. Metro Vancouver's primary hazard threats are flooding and earthquakes. Communities like Squamish to the north face these same hazards, landslides, debris flows, and rare volcanic eruptions.

Present risk mitigation strategies for earthquakes, floods, landslides, and fires are primarily structural. They include incorporation of building codes, dykes, berms, building on elevated pads in floodplains, debris flow catchment basins, rock stabilization, and fire-retardant house materials near forests. A few examples of mitigation through land use include development restrictions in recurrent landslide areas.

The Risk-Based Land Use Guide

In a pilot program begun in 2010, stakeholders are creating a risk-based land use guide for the Metro Vancouver region. Presently, stakeholders in this process include land use planners, city managers, permit and licensing staff, engineers, critical-infrastructure owners and managers, insurers, researchers and practitioners of land use policy, and emergency managers and disaster reduction policy advocates from all levels of government. The land use guide builds on Murray Journeay and colleagues' risk assessment guide created from strategic planning with the town of Squamish.

The land use guide principles include those that are stakeholder built and managed, using existing local instruments that incorporate informed practice; a balance of social, economic, and environmental concerns; transparency of knowledge; and community engagement. Local guide-creation workshops build capability in risk-based land use evaluation. Stakeholders create the guide together to ensure it is practical, applicable, and usable, and incorporates local knowledge. By connection with researchers and a practitioner network, global informed practices are identified and incorporated. Key factors of the guide include risk management instruments needed to be in place prior to a proposal evaluation (for example, hazard zonation). It provides a methodology to identify the hazards, assess the hazard potential, decide which hazards pose a threat, create an inventory of assets under threat from the hazard, determine potential losses from hazard events, identify mitigation options to reduce potential losses to community-acceptable levels, implement the mitigation, and monitor the mitigation implementation.

British Columbia requires all developments be made "safe" for intended use, though it does not describe how to calculate safety or make a development safe. Each municipality is expected to make those determinations. The risk-based land use guide will describe how to calculate the factor of safety and provide options to reduce the risk to tolerable levels. For example, the guide will describe how to set up hazard zones with special land development requirements prescribed to mitigate those hazards, how to integrate risk mitigation into official strategic plans, how to take advantage of land use types that minimize exposure to a hazard, and how to determine a proposal's hazard risk.

Risk Assessment Guide

Any evaluation of the safety of a land use proposal or strategic growth plan requires a method to determine the risk of development and use. Murray Journeay piloted a project to develop and test methods of land use risk assessment with the municipality of Squamish, which included testing the disaster loss estimation tool Hazus-MH. The initial study created and demonstrated the application of risk assessment for earthquakes, floods, and landslides in development of a low-risk community-driven strategic growth plan. The Squamish study demonstrated the value of and a methodology for community engagement in hazard and threat identification and evaluation priority setting, for application of quantitative risk assessment, and for comparing risk between existing and various potential future built environments. Comparing the risk of various future built environments determined a potential quantifiable risk reduction for certain growth plans, thereby measuring the benefit of land use risk mitigation options. It demonstrated the potential savings in dollars and lives.

Journeay and colleagues provided a guide for using quantitative risk assessment for strategic planning. Similar methods, though with different scale and emphasis, are applicable to evaluating the safety of development permit proposals. The risk-based land use guide incorporates these methods and others in the context of municipal processes for development applications and strategic planning.

and Stephen Dovers in Australia suggest that several public policy issues have impeded implementation of hazard risk mitigation: (1) government institutions dealing with disasters were designed for response rather than prevention, (2) the perception of disaster assistance as a social entitlement, (3) concern about imposing limitations on the use of private property, (4) the organizational fragmentation of mitigation effects, (5) the costs of mitigation programs (such as public acquisition of hazard-prone lands), and (6) understanding the extent of savings provided by hazard risk mitigation. As the 2011 earthquake and tsunami events in Japan have shown, even disasters with "natural" triggers can generate very long-lasting impacts globally. Short-term goals of response—saving lives and protecting assets—have to be negotiated with more strategic, longer planning horizons located within broader policy and institutional settings that recognize the impact of individual and local decisions on the economic, social, and environmental viability of a nation. This is particularly important under the conditions of changing climate and increasing uncertainty. Practical and scientific evidence has demonstrated the economic, social, and environmental return on mitigation investment. For example, Public Safety Canada reported benefit-cost ratios for flood prevention measures in Australia, the United States, and the United Kingdom as 3:1, 4:1, and 5:1, respectively. According to Charlotte Benson, John Twigg, and the ProVention Consortium, a Vietnam Red Cross mangrove planting program implemented in eight provinces to provide protection to coastal inhabitants from typhoons and storms cost an average $0.13 million a year over the period 1994 to 2001 but reduced the annual cost of dyke maintenance by $7.1 million. The program also helped save lives, protect and generate new livelihoods, and explicitly incorporate local indigenous knowledge in hazard mitigation.

Indigenous Knowledge and Mitigation

Indigenous knowledge increasingly informs mitigation decisions to better reduce the impacts of disasters. The compatibility of indigenous knowledge with scientific knowledge is a central component in developing meaningful mitigation strategies at a local level. For successful outcomes, it is necessary to facilitate culturally sensitive communication strategies between local people and the scientific community. This knowledge sharing must be based on the assumption that transparent knowledge exchange can aid local communities in addressing their own mitigation strategies while enhancing the development of emerging scientific research practices. The 1999 World Conference on Science called for “cooperation between holders of indigenous knowledge and scientists to explore the relationship between different knowledge systems and to foster inter-linkages for mutual benefit.”

Characteristics and Challenges

Although technological advancement has always been a functional component of mitigation, the mid-1980s saw the inclusion of indigenous knowledge as an integral part of the development framework. Indigenous knowledge became increasingly used in designing development projects, with a specific focus on community interventions.

Drawing on popular definitions by J. Flavier and L. Grenier, as well as countless international examples, indigenous knowledge is characterized by the following attributes:

- Locally bound, indigenous to a specific area and community
- Culture and context specific
- Nonformal
- Orally transmitted and generally not documented
- Dynamic and based on innovation, adaptation, and experimentation
- Closely related to survival and subsistence for many people worldwide

Although the value of incorporating indigenous knowledge and mitigation practices has been acknowledged, this integration has not been seamless and has met several challenges. One challenge is that indigenous knowledge can be classified based on geographical, thematic, and organizational contexts, and in many cases, these overlap. Another challenge is that indigenous knowledge is orally transmitted, and thus implementation is not traditionally documented. This challenge is twofold; first, outsiders to this knowledge may not fully understand its true depth, and second, when this knowledge is documented, it may be impossible to capture culturally specific nuances within the confines of written text.

From Theory to Practice

It is necessary to understand the foundational principles of indigenous knowledge, analyze them in tandem with scientific observations and logic, and apply these lessons into practice. The following explores an example of indigenous knowledge through the facet of local technology systems.

Amir Ali Khan provides an example of earthquake-safe traditional housing practices through an exploration of case studies in Japan, Turkey, El Salvador, Peru, Kyrgyzstan, Italy, Nepal, and India. Because of the relatively high frequency of earthquake events, traditional peoples living in these areas devised safer construction techniques to protect their homes against earthquake shaking. These techniques have evolved over time to reflect the environmental, cultural, and historical context in which they exist and reflect cross-generational experience of earthquake-safe construction practices. Building techniques were based on locally available resources to address local needs. In these countries, houses built using earthquake-safe traditional construction practices have been able to successfully withstand significant earthquake forces.

Khan demonstrated the need to integrate indigenous knowledge with the technical and scientific practices of mitigation. This can be done in two ways: first, by encouraging the inclusion of indigenous knowledge in the decision-making process; and second, through education and awareness raising of communities and stakeholders, including agencies of government, nongovernment, academic institutions, and communities. This integration and inclusion is best done in the local community, with its shared culture and geography.

Land Use Planning for Reducing Losses

Natural hazard researchers have identified local government land use planning as a critical activity for reducing natural hazard–related losses and creating disaster-resilient communities. In theory, local governments can use land use planning to reduce losses by controlling both the location and the design of new development projects that are reviewed under their jurisdiction. To be most effective in reducing losses, local governments can use land use planning to steer new development away from hazardous areas completely. When communities decide to allow development in hazardous areas, local governments can use land use planning to reduce potential losses by directing development to the least hazardous portions of project sites and/or by requiring the use of construction practices that help reduce hazard risk.

Hazard Assessments

Recent scholarship has sought to locate the concept of land use planning for natural hazard mitigation within the broader framework of sustainability and sustainable development, with poor land use planning that fosters hazard vulnerability being viewed as inherently unsustainable. Sustainable land use planning in this context requires at a minimum that decision makers be adequately informed regarding local hazard risks. To make informed decisions, government land use officials must have accurate data regarding the vulnerability of people, buildings, and infrastructure in their jurisdiction, as well as the probabilities of different hazardous events occurring across different geographic locations. Local officials must also understand how different land use decisions can affect these vulnerabilities and probabilities.

Such information can be gathered through the process of hazard assessment, which provides the factual basis for decision makers to estimate the likely costs and benefits of alternative land use scenarios and various strategies for reducing risk. Hazard assessment should proceed according to a three-step process as follows:

- *Hazard identification:* Defining the magnitudes and probabilities of natural hazards that might pose threats in a given area
- *Vulnerability assessment:* Characterizing the populations and property exposed to hazards and the extent of injury and damage that might result from natural hazard events in a given area
- *Risk analysis:* Combining hazard identification and vulnerability assessment data to provide a complete description of risk from the full range of possible natural hazard events in a given area

When applied to future land use, hazard assessment can be used to identify hazardous areas where new development should be discouraged and/or prohibited. Hazard assessment can also be used to reduce risk in areas that have already been developed by providing the justification for required retrofitting aimed at reducing risk.

Land Development and Construction

Land use planning researchers have recently turned their focus to the potential for alternative land development and construction practices to reduce hazard risks. One series of published papers from a national study of alternative subdivision design examined New Urbanist subdivisions (i.e., subdivisions that are characterized by relatively high housing densities, mixed land uses, and pedestrian-friendly design features) and their potential (relative to conventional subdivisions) to reduce losses from flood events. In particular, the authors of the papers argued that New Urbanist design features should theoretically serve to foster additional protection of sensitive floodplain areas and the incorporation of stormwater best management practices.

Other recent studies have examined the relationship between construction practices and subsequent flood losses. These studies found that construction practices that involve altering and/or destroying natural wetlands during the construction process are likely to result in increased flood losses that stem in part from the decreased capacity of the natural landscape to manage floodwaters. The studies also found that construction practices that result in increased quantities and distribution of impervious surfaces also lead to increased flood losses. In response, the authors recommend that land use planning be utilized in order to protect existing wetland areas and to limit the installation of impervious surfaces into the natural landscape.

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See Also: All-Hazards; Buildings; Hazard, Definition of; Hazard Vulnerability Analysis; Pre-Impact Planning Process; Preparedness; Prevention; Risk Analysis; Vulnerability.

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Hazard Vulnerability Analysis

The overarching goal following a crisis is to minimize its impact on an organization and return the organization to its pre-event status as quickly as possible. The hazard vulnerability analysis (HVA) is a systematic approach to thoroughly examining a hazard, the probability of a hazard becoming an event, and the resultant risks to the organization in question. A completed HVA serves as a tool used to prioritize hazards, thus giving emergency planners a way to focus resources. This article further defines a hazard vulnerability analysis, explains each component of an HVA, discusses limitations to HVA, and suggests how to conduct an HVA.

In the discussion of crises, the terms *risk*, *threat*, and *hazard* are often treated as interchangeable. For the purposes of this article, the following definitions will used. A hazard can be defined as anything that may pose a danger to an organization or institution. An event occurs when a hazard is realized and it has had an impact on an organization or institution. Risk is a measure of the probability of damage to life, property, or the environment upon the manifestation of a hazard.

Once a hazard is identified, the probability of its becoming an event is quantified according to the following formula:

$$\text{(Probability)} \times \text{(Risk)} \times \text{(Preparedness)} = \text{Vulnerability}$$

Several methods have been developed to quantify these terms. A properly performed HVA should differentiate hazards so that planners are provided with a focal point for preparedness and mitigation. Having the support of organizational leadership prior to performing an HVA is critical to its success. Without this support, findings and subsequent recommendations may never be realized. Leadership may not adopt all the recommendations, but efforts must be supported and championed from above.

Hazard Identification

Traditionally, organizations focus on natural disasters, including hurricanes, earthquakes, and floods; however, in today's environment, this may be rather shortsighted. A broad review of all hazards must be examined, especially given the global interconnectedness of our world. Table 1 refers to a partial list of hazards that should be considered.

Table 1 Hazards that should be considered

Natural events	Technological events	Human events
Hurricane	Electrical failure	Terrorism
Tornado	Generator failure	Failure of government
Severe thunderstorm	Fuel shortage	Law enforcement events
Blizzard	Sewer failure	Labor actions
Ice storm	HVAC failure	Supply chain issues
Tsunami	Fire	Bomb threat
Temperature extremes	Hazmat (internal/external)	
Drought	Structural damage	
External flood	Loss of IT systems	
Landslide	Loss of key department	
Volcano		
Epidemic		

Since this is not an exhaustive list, any hazard to an organization must be considered. A truly comprehensive review also considers hazards to business operations. It is important to look not only locally but globally as well; for example, obtaining raw materials from a foreign country that undergoes a nationwide labor action or political upheaval can result in supply chain issues.

Considerations for Hazard Identification

Dividing personnel into small workgroups is an effective way to evaluate a specific set of hazards. Each group should be composed of subject-matter experts in the areas to which they are assigned. For example, plant engineering should be represented in workgroups that examine hazards impacting infrastructure. Any group evaluating information technology (IT) hazards must have an IT professional as a member. Using this broad-based approach ensures a more thorough understanding of the capabilities and limitations of each department. If any international hazards are identified, it is best to consult members of the organization who have cognizance in international operations. The development of a large list that identifies all hazards, no matter how improbable they may seem, is preferable to having a list that fails to identify a potential hazard. The next step, after hazards have been identified, is to determine the likelihood that they may occur.

Probability

Probability—the likelihood or chance of something—can help determine vulnerability. Previous occurrence of a natural event can assist in determining the probability of its reoccurrence. History of occurrence based on geographic location can be found at a number of open-access Web sites, including those the National Oceanographic and Atmospheric Association (NOAA), National Weather Service (NWS), and National Geological Survey, all of which are well-recognized sources of information. State, local, and regional agencies, particularly local emergency planning committees (LEPCs), may also provide information. Federal law requires that producers and users of hazardous materials above certain quantities inform local agencies as well as provide contingency plans to local emergency planning committees. Establishing relationships with local organizations may provide insight into what the local community perceives as vulnerability and may lead to better cooperation and coordination during an event.

Quantifying the probability of an event can be difficult. The American Society of Healthcare Engineers (ASHCE) and Kaiser Permanente have implemented a simple 0–3 scale, with 0 meaning no probability and 3 meaning high probability. Further stratification occurs by applying a similar scale to risk and preparedness.

Risk

Risk is defined as the negative outcome when a hazard is realized and an organization or institution is negatively affected. Although many more exist, six areas of risk should be considered: threat to life and health, disruption of services, possibility of damage and failure, loss of community trust, financial impact, and legal issues.

The type, magnitude, location, and duration of impact on the environment must be considered when evaluating risk. Intangible impacts, such as loss of goodwill and reputation, must also be considered. Negative press regarding environmental contamination or violation of regulations may have a long-lasting impact.

Life, safety, and health should take priority when evaluating any hazard. The organization's role in the community (public versus private, service versus manufacturing, etc.) will determine which of these areas have the greatest risk to the organization. A 1–5 scale can be used to help further stratify the risk; the higher the number, the greater the risk.

Preparedness

Preparedness is an organization's state of readiness to respond to an event. The five major variables to examine when determining an organization's preparedness include status of current plans, training status, insurance, availability of backup systems, and community resources. Are the organization's responsible recovery plans up to date? Are the initial planning assumptions used to develop plans still valid? Difficult economic times have forced organizations to do more with less, often leaving a single person in charge of multiple areas. Should an event occur, can one person be effective in disaster response, given competing responsibilities? Can the organization continue normal operations when there is an interruption of supplies? Just-in-time logistics have replaced the warehousing of key supplies and materials, and the assumption that the organization can continue normal operations, even for several days, may no longer be valid.

An annual review of contingency plans should be the minimum requirement. Turnover of personnel and changes in responsibility must be accurately tracked. If this information is not reviewed on a regular basis, the information cannot be counted on as accurate, greatly hampering both response and recovery efforts. This is especially true in the first few hours of an event, when key people are needed most.

Training of individuals is a key component of any preparedness program. Key leaders should be trained in the principles of incident command and incident management. Many skills

Table 2 Natural events (probability) × (risk) × (preparedness) = vulnerability

	PROBABILITY				RISK					PREPAREDNESS			
	HIGH	MEDIUM	LOW	NONE	LIFE THREAT	HEALTH/ SAFETY	HIGH DISRUPTION	MODERATE DISRUPTION	LOW DISRUPTION	POOR	FAIR	GOOD	
EVENT	3	2	1	0	5	4	3	2	1	3	2	1	SCORE
Hurricane		X					X				X		12
Tornado			X				X				X		6
Severe thunderstorm		X						X			X		8
Snowfall	X							X				X	6
Blizzard	X							X				X	6
Ice storm	X							X				X	6
Earthquake			X		X						X		10
Tidal wave				X	X						X		0
Temperature extremes		X							X			X	2
Drought		X							X			X	2
Flood, external			X						X		X		2
Wildfire			X						X			X	1
Landslide			X						X	X			3
Volcano				X						X			0
Epidemic	X						X				X		18

used during day-to-day operations can be utilized but are rarely sufficient. The time frame in which decisions must be made and the amount of available information prior to making a decision vary greatly in crises when compared to regular operations. The amount of time in which to make a decision is greatly compressed. Often, some amount of information desired prior to making a decision is unavailable. The time required to gather information is often unavailable, forcing people out of their comfort zone to make decisions with a paucity of information. Making the wrong decision is often preferable to not making any decision.

Training in the terminology and principles of an incident command system is necessary in order to adequately integrate into the community's response plan, even though not every organization may adopt a formal incident command system itself. Leadership and crisis-response staff should have a working knowledge of these principles. There are several no-cost and low-cost training programs available from the Federal Emergency Management Agency (FEMA).

Frequent training exercises and drills aid in identifying inadequate response plans and give leaders an opportunity to exercise leadership in a safe but stressful environment. Realistic scenarios based upon the vulnerabilities identified in the HVA are best. Effective programs provide time and personnel dedicated to developing, administering, and evaluating drills and exercises. An effective program should not have key responders both develop the exercise and participate in the drill. Responders' participation in the running of a drill makes an impartial assessment difficult. Employing an impartial organization, either internally or by subcontracting specialists, allows an unbiased look at an organization's program.

Adequate insurance coverage should be part of any preparedness program. The insurance portfolio should include policies to cover physical loss of buildings, infrastructure, and supplies as well as loss of revenue. Insurance companies may require specific plans or specialized procedures to be in place to protect the organization from loss. Having a thorough and accurate inventory of all equipment, supplies, and infrastructure will greatly speed the filing of any claim and assist in reimbursement from local, state, and federal agencies. Having adequate response plans and procedures in place may also reduce exposure for the insurance company, potentially leading to decreased insurance premiums.

Status of backup systems should be thoroughly evaluated. Examination of processes and procedures may help identify key vulnerabilities to backup systems. These systems may be as simple as a redundant communication system that notifies leadership and management should a primary system become inoperable, or as complex as an off-site data center that maintains full data services should the primary system fail. Developing cross-trained teams from other offices within the organization should be considered prior to requesting community assistance. Most vulnerable supplies should be cached by either putting them into storage or increasing par levels so if an interruption occurs, impact may not be as severe.

As an organization becomes more dependent on technology, uninterrupted supplies of electricity are of ever-greater importance. Facility-wide backup generators may be out of reach for many institutions; however, particularly vulnerable systems can be protected by smaller generators or commercially available uninterrupted power supplies. Having agreements with companies that provide portable generators is a viable alternative. Pre-wiring of the identified circuits to receive power from a commercial generator will save time if an outage occurs.

Finally, the ability of a community to respond should be thoroughly examined. The nature of the event will determine whether one can count on community resources. If the event is localized to a single facility, such as in a fire, resources are often readily available. However, if the disaster is widespread, available resources decrease dramatically.

Relying on support from governmental agencies as the cornerstone of any preparedness program is fraught with difficulties. Each organization should prepare itself for independent operations for a minimum of 96 hours. When considering entering into agreements with organizations to provide key services, during or after an event, consider other commitments by those vendors to provide the same services. It is not uncommon in today's consolidated business environment to have committed resources to multiple organizations. If the event is widespread, vendors may not be able to meet their obligations and alternatives must be considered. A scale of 1–3 can be used, with 1 representing well prepared, 2 being fairly prepared, and 1 being poorly prepared.

Putting It All Together

Below is an example of an HVA using the ACHE format for natural events. In this formula, the probability of 0 (no risk) to 3 (high risk) is used. Risk is classified from 1 to 5, with 5 identifying the greatest threat and 1 identifying low disruption. An inverse scale is used to identify preparedness, with 3 representing poorly prepared and 1 representing well prepared. The scores from each are multiplied using the following formula:

$$\begin{gathered}(\text{Probability}) \times (\text{Risk}) \times (\text{Preparedness}) \\ = \text{Vulnerability}\end{gathered}$$

The product of all three factors gives a quantitative value to the vulnerability. If there is no probability of a hazard, a score of 0 is assigned; basic arithmetic functions then yield a vulnerability of 0. In this example, a higher number given to preparedness identifies an organization less prepared.

Each hazard should be ranked numerically, which will quickly identify any outliers. Efforts need to be focused on the greatest vulnerabilities. The completed HVA should be shared with members of the organization and should be used to gain consensus on where and how resources should be utilized. Completing an HVA annually will help determine if preparedness efforts have reduced existing vulnerabilities or if any new vulnerabilities have been identified.

An HVA is a valuable tool. If performed properly, it will identify key vulnerabilities of an organization that can then be ranked and prioritized so that resources to mitigate these vulnerabilities can be correctly utilized. As mitigations are developed, they should be tested, and training exercises should be performed regularly to ensure that they remain valid.

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See Also: Backup Strategy; Exercises; Hazard, Definition of; Insurance; Preparedness; Risk Analysis; Training; Vulnerability.

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Hazardous Materials

A hazardous material is any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment. A hazardous materials spill occurs when hazardous materials are released in an uncontrolled manner. This can happen while a substance is being transported or at a fixed facility. One example is the oil spill resulting from the April 20, 2010, explosion of the Deepwater Horizon offshore drilling rig that released more than an estimated 200 million gallons of crude oil into the Gulf of Mexico. According to the U.S. Department of Transportation, there were 14,953 hazardous materials incidents (1,389 air incidents, 12,750 highway incidents, 743 rail incidents, and 71 water incidents) in the United States in 2011 alone.

Those who use hazardous materials are required by law to report the substances being used so emergency responders know which materials may be involved in a hazardous materials incident in their jurisdiction. Vehicles transporting hazardous materials, such as railway cars and tractor-trailers, are required to be placarded with basic information about the materials they are carrying.

Hazardous Materials Identification

There are two main systems by which to identify hazardous materials. One system was developed by the U.S. Department of Transportation (DOT), and a related system was adopted by the United Nations (UN). The National Fire Protection Association (NFPA) developed an additional system of placard information.

The DOT/UN system uses a diamond-shaped placard on vehicles transporting hazardous materials. Labels are used on other types of containers. Each hazardous substance is assigned a class for identification purposes. The class of the substance is displayed on the placard in the form of a four-digit number. The placard itself is in the shape of an 11-inch diamond and has to be displayed on all four sides of the vehicle.

Placards and labels are required on all shipments of the most dangerous materials, which include radioactive materials, water-reactive flammable solids, explosives, and some dangerous poisons. Placards are also required on shipments of less dangerous hazardous materials when the shipment contains more than 1,000 pounds of the substance.

The Emergency Response Guidebook (ERG) is developed jointly by Transport Canada, the U.S. Department of Transportation, and the Secretariat of Communications and Transportation of Mexico (SCT). The ERG contains a list of the four-digit codes and the chemicals they represent. The ERG is intended to be used by emergency responders to help them identify any hazardous materials at the scene of an incident. The ERG also provides information on how responders can protect themselves and the public from the hazardous material in question. The manual outlines the particular fire or explosion dangers of the substance where applicable, as well as the health risks if one is exposed to the material. The ERG includes information on the recommended protective clothing emergency responders should wear while working near the substance and suggests evacuation distances to protect people from large spills.

There are nine categories of hazardous materials, and the hazard class of dangerous items is indicated either by its class/division number or by name, as listed below:

- Hazard Class 1: Explosives
    - » Division 1.1 Mass explosion hazard
    - » Division 1.2 Projectile hazard
    - » Division 1.3 Minor blast/projectile/fire
    - » Division 1.4 Minor blast
    - » Division 1.5 Insensitive explosives
    - » Division 1.6 Very insensitive explosives
- Hazard Class 2: Compressed gases
    - » Division 2.1 Flammable gases
    - » Division 2.2 Nonflammable compressed gases
    - » Division 2.3 Poisonous gases
- Hazard Class 3: Flammable liquids
    - » Flammable (flash point below 141 degrees)
    - » Combustible (flash point 141–200 degrees)
- Hazard Class 4: Flammable solids
    - » Division 4.1 Flammable solids
    - » Division 4.2 Spontaneously combustible solids
    - » Division 4.3 Dangerous when wet solids
- Hazard Class 5: Oxidizers and organic peroxides
    - » Division 5.1 Oxidizer
    - » Division 5.2 Organic Peroxide
- Hazard Class 6: Toxic materials
    - » Division 6.1 Material that is poisonous
    - » Division 6.2 Infectious agents
- Hazard Class 7: Radioactive material
    - » Radioactive I
    - » Radioactive II
    - » Radioactive III
- Hazard Class 8: Corrosive material
    - » Destruction of the human skin
    - » Corrode steel at a rate of 0.25 inches per year
- Hazard Class 9: Miscellaneous
    - » Miscellaneous hazardous materials or substances

NFPA System Placards

The NFPA system of hazardous material identification is also widely used. This system uses the same diamond shape as the DOT system and subdivides the diamond into four smaller diamonds, each of which is color coded. Each color has a particular meaning:

- Blue—health risk
- Red—flammable material
- Yellow—reactive
- White—special characteristics or information, such as whether water can be safely used on the substance

Each colored diamond displays a number indicating the degree of risk of that material. These numbers range from 0 (no risk) to 4 (greatest risk). As an example, a highly flammable material could have a 4 in the red diamond.

Routes of Exposure

There are four main routes of exposure by which chemicals can enter a body: inhalation, skin contact, eye contact, and ingestion. Chemicals in the forms of gases, vapors, dust, or mist may be inhaled through the mouth or nose. Many chemicals can cause irritation, itching, or swelling when they come in direct contact with the skin, and some chemicals can be absorbed through the skin. Chemicals can also enter the body through contact with the eyes. Gases, vapors, dust, or mist can all come in contact with the eyes. Additionally, liquids can be splashed into the eyes. Chemicals may be ingested through the mouth by swallowing. This can result from hand-to-mouth contact or consuming contaminated food or beverages.

Personal Protective Equipment

It is essential for emergency services personnel to wear personal protective equipment (PPE) when responding to hazardous materials incidents. There are three zones (cold, warm, and hot) in a hazardous materials incident that correspond to the level of protection one needs in order to safely work within that zone. Each zone is discussed in further detail below.

Personnel who enter the warm or hot zones need to wear appropriate protective clothing and equipment. There are four basic levels of protection, with the highest being Level A and the lowest, such as street clothing, being Level D. A person wearing Level A equipment is theoretically protected for short exposures in an atmosphere that is immediately dangerous to life and health (IDLH), and for prolonged work (such as cleanup operations) in contaminated areas identified as having a short-term exposure limit.

Air purification devices or self-contained breathing apparatus (SCBA) help minimize the risk of inhalation exposure and should be used by personnel in any IDLH atmosphere. An IDLH atmosphere is one in which the maximum to which a healthy worker can be exposed to the substance in question is 30 minutes in order to escape without suffering irreversible health effects. Personnel who remain in the cold zone should still wear PPE, including gloves, face shields or safety goggles, masks, and overboots, to prevent accidental exposure to the hazardous substance.

Four Levels of Personal Protective Equipment

The following list details the four levels of personal protective equipment (PPE)—A, B, C, and D:

- Level A is the highest level of protection. This is a fully encapsulated chemical-resistant suit with a double layer of chemical-resistant gloves, chemical-resistant boots, airtight seals, and SCBA.
- Level B protection includes a chemical-resistant, long-sleeved suit with double layer of chemical-resistant gloves and chemical-resistant boots. Those using Level B protection still need to use SCBA to enter the hazardous environment.
- Level C protection includes an air-purification respirator, chemical-resistant suit, chemical-resistant outer gloves, and chemical-resistant boots.
- Level D is the lowest level of protection and does not provide respiratory protection. Regular work clothes would be considered Level D protection.

Control Zones

As mentioned above, there are three main zones within which one may operate at a hazardous materials incident. The hot zone is an area into which only those with the highest level of protective clothing can enter. The hot zone is sometimes also referred to as the exclusion or restricted area.

The warm zone is the control area immediately outside the hot zone. It is also referred to as the decontamination or limited access area. Only those properly trained and equipped to assist with decontamination should enter this area. The inner and outer borders of the warm zone might be as far as 120 feet apart, depending on the scope of a particular operation.

The cold zone may also be referred to as the clean area. This is where the command post is located. Transport lines form in this zone to receive patients as they are passed outward.

When responding to a hazardous materials event, emergency personnel should approach the scene from uphill and upwind to prevent accidental contamination. This is more feasible when responders know ahead of time about the possibility of entering a hazardous environment. In some instances, personnel may enter the hazardous environment before they realize the nature of the situation.

Decontamination

One of the most important principles of handling hazardous materials is to prevent further contamination. All people and equipment involved in the incident need to be decontaminated in order to remove the substance. All materials used for decontamination, such as the water used for washing and flushing the area, also need to be disposed of properly.

There are four general types of decontamination, as follows:

- Mechanical decontamination involves brushing or wiping substances (such as dust or powders) off the victim. This is the first step of gross decontamination.
- Dilution involves washing the substance off, most often with plain water. If the hazardous material is water-reactive (such as sodium or lithium) or nonsoluble, detergent should be added to the water in order to remove the substance.
- Degradation is the chemical alteration and neutralization of the hazardous nature of a substance. This process may be used on

equipment but is not practical for use on people.
- Isolation of remaining hazardous materials as well as materials used for decontamination is also necessary. Collection systems for water runoff, for example, are important, and in some jurisdictions mandatory. Hazardous materials should not be allowed to run into the drainage system.

There are several resources available for information on what to do when dealing with various types of dangerous substances. Some are more appropriate for individuals, while others are geared toward emergency response personnel. CHEMTREC is a private service for information about chemicals involved in transportation accidents. The Centers for Disease Control and Prevention (CDC) provides information about biologic and disease-related hazards. There are nearly 40 regional poison control centers that cover all regions in the United States. Finally, the National Pesticide Telecommunications Network (NPTN) is a 24-hour service for information related to pesticide exposures and accidents.

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See Also: All-Hazards; Centers for Disease Control and Prevention (CDC); Chemical Risk; Electronics Waste; Emergency Medical Care; Emergency Responders; Environmental Contamination; Nuclear Risk; Petrochemical Risk; Sewage Spill.

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Hazardous Waste Disposal

Hazardous wastes are defined by the Environmental Protection Agency (EPA) as substances that have no commercial value and cannot be sold or recycled. These substances primarily include secondary waste from commercial and industrial activities, such as leftover chemicals at dry cleaning facilities or hazardous by-products used in the manufacturing process. These substances often include mercury, agriculture chemicals, benzene, and other hydrocarbons such as used motor oil. Hazardous wastes may also include the leftover by-products used to manufacture illegal drugs such as methamphetamines. Hazardous waste products are highly regulated throughout the industrial world. This is primarily because of the environmental and health hazards that they pose.

Concerns

Various accidents have occurred involving hazardous waste products, resulting in thousands of deaths as well as multiple sites that require cleanup. In many areas of the world, the water supply has become so contaminated with hazardous waste there is little potable water available. In other areas, lakes and rivers that are commonly used by communities and villages to supply both potable and nonpotable water resources are completely unusable. The vast majority of hazardous chemicals are generated from household use, such as pesticides, household cleaning supplies, and related materials. Many households are unfamiliar with how to properly use these chemicals, which results in hazardous waste products. Moreover, these products are often poured down the drain or flushed into the toilet, which may result in the contamination of the local water supply or the ground surrounding the home. Unfortunately, few homeowners realize just how hazardous this waste can be until family members become ill. Luckily, private organizations and government agencies have implemented local recycling efforts so that homeowners have a place to drop off their hazardous waste materials.

Children and adults alike have suffered as a result of poorly managed hazardous waste sites. This has resulted in a large occurrence of non-treatable cancers, respiratory illness, deformities in newborns, and children born with delayed mental faculties. This is especially common in underdeveloped countries where large industrial organizations have relocated because of a lack of environmental enforcement by the government. Bribery of officials has also been documented in these countries, with the result that illegal hazardous waste operations are often overlooked. In some cases, entire provinces or large sections of land are no longer usable. Humans are no longer able to occupy these areas.

These illegal sites not only affect humans, they also affect wildlife. Many countries have seen entire species eliminated as a direct result of illegal hazardous waste sites. However, the majority of hazardous waste sites completely follow all legal and regulatory standards while managing this waste. Local emergency planning committees (LEPCs) have been formed in most communities to keep the public informed and assist these hazardous waste sites in their efforts to follow the law. Large industrial producers of hazardous waste are required to complete Tier II reports each month and send these reports to local and state officials. State emergency response commissions (SERCs) have been formed in order to manage hazardous waste sites and to manage incidents involving accidental releases of hazardous waste materials.

Steven Guy shovels up what remains of his house after an EF-4 tornado hit on April 27, 2011. Hazardous waste from disasters must be separated from other debris such as wood, electronics, large appliances, and household garbage for proper disposal.

Background

The U.S. Congress passed the Resource Conservation and Recovery Act (RCRA) in the mid-1980s in an effort to regulate the generation, storage, treatment, transportation, and disposal of wastes considered to be hazardous. Congress gave oversight of this act to the EPA, which also allows some states to regulate their own hazardous waste under the law. The law was passed in response to an increase in the number of hazardous materials being released into the air as well as into the groundwater by individuals, service industries (e.g., dry cleaners), and manufacturers. Scientific evidence suggests an increase in the number and types of cancer and other medical conditions in the areas near these releases. Moreover, several historical incidents involving hazardous wastes have occurred, prompting the public to demand that the federal government pass laws concerning hazardous wastes. These incidents include the Hercules Chemical Plant in Jacksonville, Arkansas, which manufactured Agent Orange for the military during the Vietnam War, and several waste pit owners, who were accused of dumping hazardous waste into local rivers.

In addition to the United States, many other industrialized countries also have regulations concerning hazardous waste. These regulations include the Framework Directive on Waste (European Union), the National Solid Waste Policy Bill (Brazil), and the Regulation of Exports and Imports Act (Australia). Other countries, such as South Africa, Mexico, and India, have similar regulations in place. Moreover, international treaties such as the Basel Convention (1992) and the Waigani Convention (2001) formalized agreements between 151 countries that serve to minimize generation, prevent unlawful disposable, control and reduce international movement, and ensure sound management practices associated with disposal of hazardous wastes. These conventions also establish mechanisms to prosecute those accused of unlawfully disposing of waste.

Regulatory Efforts

Aside from regulations and laws such as RCRA, the U.S. Congress passed the Superfund Amendments and Reauthorization Act (SARA) to assist with the cleanup of illegal hazardous waste sites. Moreover, the act provides a funding mechanism for hazardous wastes sites that are so large the owner is unable to pay for their cleanup. Some of these sites may have been legitimate sites that experienced an extraordinary event, such as an accidental spill, or they may have been sites that operated outside their state or federal authorization. However, the United States has so many sites there is not enough funding available to pay for the cleanup. Therefore, the EPA has created a list of sites based upon priority. The sites that have the potential of affecting the largest number of citizens are usually placed at the top. These sites may have contaminated the local water supply, may be located near a school, or have the potential to affect entire communities.

Citizen groups such as the Sierra Club have not only researched the effect of hazardous wastes on the population and the environment but have also enlisted respected scientists to help them promote change. These groups have helped open forums with citizens and government leaders, presented scientific research in well-respected journals, and filed lawsuits against private companies and the government. Many of these efforts have led to enforcement activities, including successful prosecution of illegal waste operators and cleanup of illegal sites. Medical leaders have also joined these efforts by researching high rates of cancer in these areas.

A global reduction in the economy that started in 2008 significantly reduced the management of hazardous waste concerns. Although the regulations and laws on the books never changed and the EPA and similar agencies still require the transport and disposal of hazardous waste per law, reductions in investigative staff may have contributed to an increase in illegal waste sites. Moreover, many companies filed for bankruptcy and simply closed, leaving hazardous materials behind. Local, state, and federal agencies were left with the responsibility of locating the owners and trying to prosecute them. These agencies were also left with the responsibility of securing the sites and trying to find funds to remediate them. Because bankruptcy courts are charged with ensuring that any remaining assets are paid to creditors, government agencies often have found that their hands are tied when trying to penalize these companies. This has not stopped them from prosecuting the company leaders.

Additional current efforts include changing how hazardous waste is classified so that the public has a better understanding of these hazards. These efforts include changing warning placards on transportation vehicles such as trucks and ships and informing the public where hazardous sites are located. However, with the advent of the global war on terrorism and concerns about domestic terrorism, the U.S. Department of Homeland Security is attempting to change how these notifications are made. Additionally, these efforts include removing placards and signage so that potential terrorists are unable to access hazardous waste that may be used in creating a weapon of mass destruction (WMD).

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See Also: Chemical Risk; Crisis, Definition of: Crisis Communications; Documentation; Emergency, Definition of; Emergency Medical Care; Emergency Responders; Environmental Contamination; Evacuation; Exercises; Health and Medical Response Scenarios; Mutual Aid and Assistance; Nuclear Risk; Preparedness; Public Awareness and Education; Response; Sewage Spill; Training; Uncertainty.

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Health and Medical Response Scenarios

Health and medical care staff and systems play key roles in the response and recovery from crisis events (such as mass transportation accidents and acts of terrorism). Disasters such as Hurricane Katrina and the 2011 Japanese tsunami illustrated how hospitals could be destroyed or rendered unusable. Under such circumstances, hospitals and medical staff have to establish and work from ad hoc facilities. Even if remaining intact, hospitals will have to operate at considerably reduced capacity as a result of, for example, losses in infrastructure (such as damage to buildings and equipment and loss of critical care facilities) or in staff (pandemic influenza creates patient surges at the same time as staff availability is reduced by increasing infection rates). Crises result in staff having to work long hours, often in temporary locations, while possibly having to contend with personal loss and increased threats to themselves and their families (such as the risk of infection from pandemic or biohazard events).

Being able to respond to crises requires the development of crisis management systems, competencies, processes, and procedures. This commences with planning for worst-case scenarios that identify the circumstances and consequences hospitals and their staff could encounter. This article outlines the context in which medical response planning occurs and discusses what hospitals and medical staff can do to adapt to crisis circumstances and consequences.

Context

Health and medical crisis management starts with anticipating the point where the surge in demand from a crisis event will overwhelm normal capabilities and resources. This could occur acutely (for example, with an earthquake) or over time (as with a pandemic). Identifying where this occurs signals where crisis management activities and processes are required to accommodate issues such as the following:

- Hospitals overwhelmed to the point of actual functional collapse
- Staff working in ad hoc, remote treatment centers
- Staff working with representatives of several departments, agencies, and jurisdictions
- Infrastructure/service failure or intermittent access to services and utilities
- Reconciling inpatient and survivor medical needs
- High levels of public risk and multiple deaths
- Distressed publics seeking guidance, information, and services
- Dealing with the worried well
- Staff shortages from lack of availability, exhaustion, or sickness that increase over time
- Staff concerns for workplace and family safety
- Public searching for friends and relatives in hospitals
- Blood shortages
- Integrity of information channels being overwhelmed, disrupted, or lost
- Medical supply and personal protection equipment inadequacies, shortages, and losses
- General practitioners seeking advice
- Private hospitals and rest homes seeking advice and/or being overwhelmed
- Mass evacuations into or away from a city
- Large numbers of patients and staff requiring decontamination
- Resource limitations that increase over time

Anticipating these issues provides the foundation for planning that identifies the systems and procedures required to facilitate a capacity to adapt to crises. This work is performed by senior management teams. During a crisis, the senior management group is involved in planning for hospital and staff recovery.

Planning

Crisis management planners develop crisis management policy and the training and organizational development required to ensure that plans can be implemented promptly should a crisis occur. During a crisis, senior management teams identify and procure future resource needs (over

Case Study: Medical Crisis Management Capability Exercise

Outbreaks such as severe acute respiratory syndrome (SARS) and swine flu highlighted the need for medical and health facilities to develop crisis management capability. The rarity of such events and the suddenness with which they can occur makes the use of simulations that provide comprehensive tests of national systems an important tool in developing crisis management capability. This case study discusses an exercise designed to practice and assess key elements of an effective medical crisis management capability including public health interventions (surveillance capability and capacity, early detection and isolation of cases, quarantine of contacts, and use of antivirals); cluster control (contact tracing procedures by public health services, isolation procedures and protocols, reconfiguration of health services, and preparation for establishment of community-based assessment centers); communications with public and media (content and distribution of fact sheets, management of Web site information for consistency and currency, and regular media briefings); and exercise operations centers (capability and capacity of these facilities to effectively operate during a pandemic event).

The exercise included 21 health boards, public health services, the Institute of Environmental Science and Research, and the Ministry of Health. The exercise was evaluated and analyzed using data and information obtained through debriefings with exercise participants, facilitators, and evaluators. Observation notes and comments from evaluators using predeveloped templates, narrative feedback, and feedback were received from 20 district health boards and seven public health service units.

Identification of Needs

Evaluation identified a need for crisis management to address issues relating to policy, procedures, and guidance; systems, tools and processes; human resources; capability and capacity; communications; and monitoring.

A need was also identified for comprehensive policies, procedures, and protocols designed specifically to enable effective and timely response to crisis events. This included developing clear guidelines to inform the establishment and operation of community health resources. To implement the latter, evaluation identified a need for improved crisis management systems and processes. A need to develop communication systems across the health sector to facilitate more effective communications during a crisis was evident. In particular, more attention to clarifying what was required by each agency and function was called for to ensure effective implementation and coordination of response processes. The absence of such coordinating mechanisms resulted in some agencies preferring to follow their own established processes, resulting in a breakdown of a national response that relies on the coordinated use of limited resources. This identified a need to develop clear and consistent communication systems and processes, developing them in a consultative manner to increase sector willingness to engage with developed processes. Consequently, a need for the collaborative development of current systems and tools in ways that contribute to ensuring they are effective and utilized consistently in a crisis was recognized.

The exercise also identified a need for more training in and improved tools for evaluation activities to contribute to the progressive development of crisis management systems and capability. Other findings related to resource availability. Some emergency operations centers across the sector identified a need for more facilities and equipment to enable them to respond effectively during a pandemic crisis. Human resource issues, particularly regarding training and staff deployment resources, were identified, as was recognition that there were insufficient people to perform as efficiently as required. In some areas, further training in coordinated incident management was required to allow staff to better understand their role and increase their capability, particularly with regard to teamwork. Analysis of team functioning highlighted a need for clearer definition of roles and responsibilities across the sector to avoid confusion and misunderstandings and to optimize use of limited resources. A need was found for more trained staff to be available to cover contingencies and additional functions (for example, redeploying child health nurses to surveillance) where required.

During the early part of the exercise, confusion and misunderstanding affected the quality of communication and effective coordination of resources. This was particularly so when new and crucial information was introduced. This identified a need not only for better pre-event communication training but also for the development of better coordination of health sector resources and more effective monitoring of activities being undertaken across the sector during response.

the next week to months) and start planning for hospital and staff recovery and the return to normal functioning. Planning culminates in developing crisis management capability across all hospital functions in ways that accommodate novel demands such as multiagency response, staff roles and deployment, remote treatment needs, and staff ability and willingness to report to work.

Multiagency Response

Planning should extend beyond a given hospital to encompass the regional and multiagency issues required to develop a tiered, scalable, and flexible surge capacity to provide care for prolonged mass casualty events. Planning should involve key stakeholders (emergency medical services; emergency management; public health; public safety/law enforcement; health care systems; hospitals and hospital associations; Red Cross; mental health; jurisdictional legal authorities; professional associations such as pharmacy, medical, nursing, and mental health; and health professional training institutions). This ensures that, as far as possible, all professional, jurisdictional, and regional stakeholder groups likely to have roles and responsibilities are identified and included in the planning process. This can be facilitated using planning models such as the medical and health incident management system. It is also important to consider likely public behavior (such as public reluctance to present to inoculation centers in a bioterrorist event). A failure to anticipate likely public behavior could result in resources being wasted by planners' inappropriate assumptions about public response to medical crises. Planning needs to pay particular attention to issues associated with staff deployment and availability.

Staff Roles, Deployment, and Availability

Planning must consider how preexisting staff roles, functions, and deployments may change during crisis response. For example, staff without ongoing duties could be redeployed (for example, removing debris from hospitals or preparing facilities for patients). To expedite this, it is necessary to conduct staff audits and anticipate staff deployment in relation to crisis demands and needs and not in terms of normal staff roles and patterns of deployment.

Planning should accommodate, for example, identifying the roles and type of staff required, possible threats to staff and their families, the provision of crisis management education and preparedness, and response and support training to develop staff confidence in their role and to mitigate risk in the workplace (risk management protocols, personal protective equipment, and antivirals). All staff should be involved in planning. This ensures that resource use is optimized, staff needs are acknowledged, and training needs are realistic, and that planning increases commitment to training and plan implementation. The importance of the latter derives from the possible need for staff to operate outside normal hospital environments.

Events such as earthquakes can damage infrastructure over a wide geographical area. To accommodate the fact that many survivors will not have immediate access to hospital care, remote facilities to compensate for overwhelmed, damaged, or destroyed hospitals must be established and resourced. Remote settings capable of acting as temporary hospital facilities (such as churches, community centers, government buildings, hotels, medical clinics and surgeries, sports facilities, and warehouses) should be identified. Planning for the operation of remote centers should be modular, in 50-patient increments, to facilitate estimating staffing, resourcing, and administrative needs during response. Plans should also address transportation to and from sites, how health care workers from other agencies or specialist teams will be deployed and integrated into these locations, and how communications will be established to coordinate implementation and communicate with, and provide support for, the public. Good communication with the public may prevent systems being deluged by patients who may not be ill but who have concerns and who are seeking further information or evaluation. The importance of doing so is influenced by the effect a crisis can have on staff availability.

During a medical crisis, some staff may be unable (because of transportation problems) or unwilling to work (because of concerns about their own safety and health, or that of their families). Anticipating staffing issues ensures that plans are based on realistic expectations of what could reasonably be accomplished under different staffing scenarios.

Staffing issues stem from both hazard and risk perception issues. Medical staff are more likely to report for work following weather and geological hazards, as they tend to be more familiar with them. They are less likely to turn up for influenza pandemic events, and even less likely for bioterrorism scenarios. The latter problems reflect medical staff knowledge about the infectiousness of diseases and the implications pandemic and biohazard events have for their health and that of their family. Other reasons why staffing issues can arise in crisis response include:

- Childcare and elder care responsibilities;
- Personal health concerns;
- Confidence in personal safety while at work and/or their ability to perform duties;
- Transportation issues and being able to safely get to work, especially if in a different location;
- Perceived problems accessing vaccines, antivirals, and protective equipment;
- Lack of confidence in the health service/hospital preparedness; and
- Distrust of employers and the credibility of risk information and risk management practices.

Knowledge of such factors informs planning, training, and resourcing (provision of vaccinations and/or antivirals and protective equipment) for health workers and their immediate family. Transportation issues can be addressed by identifying employees with four-wheel-drive vehicles and arranging pickup points for essential personnel. Hospitals can preplan emergency childcare and elder care facilities, and personal health issues can be mitigated by encouraging staff to maintain an emergency supply of medication at work. Staff should be encouraged to develop household and workplace emergency plans (emergency contacts, arranging caregivers, family emergency planning) prior to crisis events occurring. Staff ability or willingness to work illustrates how crises can affect resource availability over time and introduces the need to manage the deployment of limited health care resources.

Crisis Response

In circumstances in which the demands made on medical systems exceed available resources, a key crisis management function involves adapting plans and actions by balancing health care objectives and operational realities (such as standards of patient care against the number of staff available to provide that care). At this level of crisis management, multidisciplinary and multiagency teams are required to balance medical, public health, transportation, and public order issues (such as coordinating with police and transport groups to get patients to remote treatment centers or to hospitals), to prioritize problems, and to plan the deployment of limited resources (for example, redeploying staff to triage or treatment centers or readying hospitals to receive casualties). This involves diverse professions (medical staff; public health officials; emergency response teams; biological and radiological experts; emergency management officials; municipal agencies; and private organizations responsible for transportation, communications, medical services, disaster assistance, and public works construction) collaborating to access, interpret, collate, and use information to manage medical crises. Team development activities are required to develop the capability of such teams to utilize their collective expertise, even if dispersed (as when operating in remote triage or treatment centers) or contributing different perspectives, to facilitate the deployment of doctors, nurses, paramedics, and others operating at the front line to meet the medical and health needs of survivors.

Frontline Response

Crisis response results in medical staff having to apply their professional, technical, or scientific skills in atypical, challenging, and threatening circumstances. Operational staff (doctors, nurses, emergency medical technicians) may be functioning in a hospital environment or they may be working in remote locations with varying degrees of access to resources and facilities (for example, remote, temporary hospital facilities set up in a town hall). They may be performing their normal roles, or they may be reassigned to nonroutine roles such as communicating with the public, disaster triage, or body identification. Disaster triage illustrates how working in disaster contexts can result in familiar tasks taking on an unfamiliar guise.

Triage during a disaster differs from that performed in routine prehospital and hospital settings. The number of people to be treated is greater, and the availability of medical resources to treat them is limited and may be absent. Consequently, patients may remain in situ for prolonged periods of time during which they will need to have their status reassessed frequently. Furthermore, triage will be decentralized and possibly occurring in several locations spread over a large geographical area simultaneously. Under these circumstances, patients who might be expected to recover under normal circumstances may experience deterioration in their condition as a result of delays in getting hospital care.

In the absence of specific crisis response training, medical staff will present with triage experience derived from situations in which definitive care is immediately available and triage required only once. Training is required to develop skills suited for making treatment decisions when access to definitive care for patients is problematic. This includes estimating the delay before definitive care will be available or accessible, and thus the time patients will require in situ care under challenging circumstances before being evacuated to the hospital. Including these additional time and assessment issues is important. The longer staff are required to treat survivors in isolation, the more frugal they must become in the use of supplies and in the selection of patients to treat. The ensuing conflict between their normal role expectations and the demands of crisis response can be a significant source of stress.

Because it can have a profound impact on staff performance and well-being, managing psychological stress in frontline staff is an important component in an effective operational response. This can be done through staff monitoring, support, and counseling services and through training covering, for example, surveillance, diagnosis, reporting, emergency patient care (risk assessment, planning, response roles, and communication), and public health emergency preparedness. Staff education and training promotes better understanding of risk, enhances knowledge, and increases the ability of medical staff to function safely and effectively in a crisis.

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See Also: Biological Weapons; Hospital Emergency Room; Influenza; Mass Care; Mass Fatality Management; Pandemics; Public Health Surveillance; Quarantine; Red Cross and Red Crescent; Severe Acute Respiratory Syndrome (SARS); Surge Capacity, Hospitals; Trauma; Triage; World Health Organization, UN (WHO).

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Heat Waves

Heat waves are extended periods of abnormally high atmospheric temperatures and humidity extending from more than one to several days. They are also referred to as extreme heat events (EHEs). EHEs are a global phenomenon that affects both developing and developed nations. There have been more incidences of EHEs in the last two decades because of the global warming phenomenon, which has given rise to a number of climate extremes, including floods, drought, heat waves, and many others. Heat waves are more pronounced in densely populated areas because of urban heat island effects.

Over the last few years, there have been high mortality and morbidity cases in various parts of the world resulting from heat wave episodes. An estimated 35,000 deaths were recorded in Europe during the 2003 heat waves, with 15,000 of the deaths being in France. In 1998, over 2,000 deaths were recorded in a heat wave episode in the Orissa and Andhra Pradesh areas of India. Similar numbers of deaths were also recorded in Athens in 1987. An estimated 692 deaths were recorded in Chicago, with over 3,000 sent to the emergency room in 1995 heat wave episodes.

Extreme heat events can result in a severe crisis from the potential impacts on human health and an increased burden of mortality. During EHEs, there is a slowing down of the evaporation of body perspiration that helps cool the human body. The body then has to work harder to maintain a normal body temperature of around 98.6 degrees F. When the thermoregulatory system fails as a result of excessive heat, it results in various heat-related illnesses such as heat stroke, heat exhaustion, heat fatigue, heat syncope, and skin eruption. Most EHE-related deaths are caused by heat stroke, where extreme body temperatures above the healthy limit lead to damage of the thermoregulatory system and body cells. It can result in confusion and, in some cases, unconsciousness. The complications that can result from heat stroke include kidney failure, liver failure, disseminated intravascular coagulation, and respiratory distress syndrome. It can also contribute to thrombogenesis and interfere with hypertension treatment. Heat exhaustion is also very common and in most cases precedes heat stroke. It is often characterized by dizziness, fainting, and headache.

Heat waves pose serious health risks to all categories of people. However, certain categories are more exposed and vulnerable to the impacts of heat waves. They include infants and children up to 4 years; elderly people aged 65 and over; overweight people, because of the tendency of their bodies to retain heat; diabetic people; and those with heart and blood pressure conditions. Other groups of people who are also very vulnerable are people confined to bed and who are unable to care for themselves; people on medications such as anti-inflammatory drugs, neuroleptics and antidepressants, beta-blockers, sulfonamides, benzodiazepines, and a host of other medications that aggravate dehydration. EHEs can also cause crisis-level weather conditions like drought, which can impact crops and put stress on livestock and pastures.

Crisis Response

During heat wave episodes, the responsible government organizations and crisis managers have a role to play in alerting people about what to do or not to do in order to avoid the effects of EHEs. This helps influence the behavior of the public during the episode and helps in reducing potential mortality rates. Certain countries like France and Italy have now developed action plans for managing EHE episodes. These include alert systems for health warnings, providing advice to the population, and activating the social and health care networks.

Crisis managers should put mitigation strategies in place to reduce the impacts of EHEs and the associated burden of mortality. Mitigation strategies include a health heat warning system that uses weather forecasts. Communication of warnings, where applicable, should use a community-based approach to ensure that very vulnerable people like the elderly are reached. Reliable heat stress indicators should be identified by managers or other responsible authorities one to two days in advance to give enough time for the activation of an emerging plan.

The health heat warning system should take into account the threshold above which potential health effects set in, as different populations respond in different ways when exposed to similar weather conditions. The thresholds are often derived from statistical studies of relationships between mortality rates and weather conditions like temperature and humidity. They can also be derived from biometrological studies. When threshold limits are forecast to be reached or exceeded, the activation of the warning system is required. Responses should ideally be tiered or multistaged. This allows for adequate time to weigh the risk to public health and determine an effective response approach.

During EHEs, managers and authorities should provide specific advice to the public on how to recognize the problem and how to protect themselves and other people. Generally, the public should be advised to keep cool and increase their intake of fluids (nonalcoholic). People under instructions from their doctors to limit fluid intake should check with their doctor on how much they can take. People should also reduce physical activities, avoid alcohol, stay indoors and take frequent cool showers. Outdoor activities should be scheduled for morning and evening hours when the temperatures are relatively lower. Lightweight, light-colored, and loose-fitting clothing should be worn.

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See Also: Climate Change Adaptation; Crisis Communications; Emergency Public Information; Smog.

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High Reliability Organization Theory

High reliability theory's (HRT) central assumption is that organizations existing within complex social, political, and technical environments can perform at highly reliable levels. In the 1980s, scholars disputed the idea that high risk organizations (HROs)—those in the nuclear, electricity, health care, and transport industries—were fertile grounds for disaster. Their objectives and what ultimately became their theoretical foundations were to examine high risk organizations to determine the behavioral components that limit accidents from occurring. Otherwise known as the Berkeley group, these scholars recognized three organizations in the United States distinguishable for their record of reliable performance: (1) the Federal Aviation Administration air traffic control system; (2) the Electronic Operations and Power Generation Departments of PG&E, including the Diablo Canyon nuclear power plant; and (3) the peacetime flight operations of the U.S. Navy's Carrier Group 3 and its two nuclear aircraft carriers. Together, the examination of these organizations laid the groundwork for the high reliability framework.

Later, theorists such as Karl Weick and Paula Consoloni contributed to HRT's premises. High reliability organization theory and HROs are distinguished against Charles Perrow's Normal Accident Theory, which focuses on how an organization is structured and suggests that crisis triggers are inevitable, or "normal," in complex, tight-coupled technological systems.

In particular, Karl Weick's notion of mindfulness and group cohesion is arguably his major contribution to the theory. Focusing on the notion that HROs continuously must deal with the unexpected, and therefore know how to react, Weick argues that HROs must deal with the unexpected rather than ignore it, because failure to do so can be fatal. Five identified ways in which HROs operate that help them cope with the unexpected are preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, commitment to resilience, and deference to expertise. However, it was the Berkeley group—with their emphasis on political science, engineering, psychology, and business—that made the contention that organizations can be free of human error as long as humans exert the effort to remain error free. They outlined the following strategies as ways for organizations to operate on a safe and reliable level.

Redundancy

Organizations that are complex and tightly coupled can perform at their highest levels when personnel, technical components, or operators back up failing parts or others' failures to perform a task. One notion of redundancy is that the probability of consequential failure is reduced when this strategy is properly enacted. For this strategy to work, HROs must coordinate communication at all levels. Organizational leaders must make it a goal to put safety first and disseminate that goal to interdependent departments. HROs must also strive for balance and be prepared to engage in decision-making processes that are dynamic and interchangeable. Thus, individuals at all levels of an organization must be open to the notion that accidents can occur and be educated on how to fix potential problems. High levels of redundancy enable individuals to reorganize, restructure, and rethink their activities. Others would argue that organizational members should focus less on decision making as a possession and more on the flexibility of sensibleness. Thus, the act of sensemaking also enables organizational members to rework original safety contentions and adapt to unforeseen situations that can have disastrous consequences. However, such balance must also be sustained, and along with high levels of redundancy there also needs to be a culture of reliability.

Culture of Reliability

Creating a culture of reliability involves a continuous and decentralized practice of operations. Those in leadership positions must be able to rely on the decision-making authority of every member of the organization. Interruptions can occur at any time, so it is imperative to be flexible to changing conditions. Certain conditions can occur within an organization (such as system breakdowns, technical failures, or disgruntled personnel); however, social conditions can also affect the performance of an organization. Thus, organizational leaders—in order to sustain balance—must be able to anticipate such conditions while creating a resilient frame of reference for all members.

Recognizing anticipated hazards can impede one's ability to make informed decisions; however, creating a culture of resilience and acknowledging the inevitable can also reduce impending and often unexpected dangers. Thus, the entire organization must be able to create something reliable out of unreliable parts. Giving members of an organization the autonomy to react to intricate and complex interactions instills a sense of competence and enables members to correct tightly coupled processes before they become problematic. Thus, routinization is not a goal; instead, variations in organizational practices are key to challenging employees and creating a resilient and reliable culture.

Conceptual Slack

In order to avoid undue or uninformed actions, organizational members can apply a strategy otherwise known as "conceptual slack." Conceptual slack is the idea that decisions regarding technology and production processes are negotiated and discussed between interdependent members before a course of action is taken. This strategy works best when a system is loosely coupled or when an organization has enough time to be able to work through potential safety premises or procedures. Conceptual slack can also occur in a hierarchical or linear fashion; it can take formal or informal relational forms and can build solidarity, trust, and credibility among organizational members. This can occur through socialization, training, and the initiation of sensemaking in new, updated, and modified ways.

It is a human tendency to normalize an unexpected event in order to ease one's tensions. This is part of a larger tendency to seek confirmation for an original belief and disconfirm that anything is wrong. Mindfulness can also be applied to the concept of conceptual slack. Mindfulness refers to the organization's infrastructure—all of its members thinking through processes that will have an error-free outcome. Thus, mindfulness acts as a mediator between the following processes: (1) preoccupation with failure, (2) reluctance to simplify interpretations, (3) sensitivity to operations, (4) commitment to resilience, and (5) underspecification of structures and the capability to discover and manage unexpected events. Conceptual slack is also a strategy that can enhance organizational learning. Similarly, mindful updating is a focus on failures, resiliencies, or other small changes that occur within the day-to-day operations of the organization. Thus, the goal then is to detect the warning that danger is present and then to become aware of the unexpected and work to contain the unexpected when it surfaces, all of which contribute to conceptual slack.

Organizational Learning

Organizational learning can occur through trial and error, although error is not recommended in high risk organizations such as nuclear power plants or power grid companies. Maximizing challenges and variety in continuous operations is one way to enhance learning, although critics believe that it is impossible to engage in such an activity because of the cataclysmic consequences of mistakes. Critics of HRT also contend that it is too difficult for HROs to engage in trial-and-error learning because error-free consequences only exist in training. However, organizations can insist on training employees by creating simulated models designed for failure. Also, organizational leaders, by creating a culture of resilience and reliability, can instill a sense of urgency and determination in their members toward reducing and managing risks. Sociotechnical systems require a standard of performance, and thus learning is not a static state; it takes constant training and understanding of the internal operations of an organization and its social environment to remain error free. Learning is also a cognitive process, one that requires the formation of new schemas and new ways of conceptualizing organizational typologies. Thus, products, people, and particulars of organizing are apt to alter and progress as humans enact problem-solving activities. Every new schema that results from this process is learning taking place.

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See Also: Air Travel; Backup Strategy; Coupling; Emergency Management, Principles of; Groupthink; Incidents Versus Crises; Interoperability; Normal Accident Theory; Organizational Failure; Resiliency; Safety Policies; Threat Detection.

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Hijackings

Hijacking is the unlawful seizure of an aircraft by an individual or a group. It is generally associated with terrorism, although some hijackings have been carried out by criminals for personal gain. The intention is to use the crew and passengers as hostages, occasionally to obtain some financial reward but more often to obtain some kind of concession from a government or governments. The concession varies from highlighting the grievances of a particular community to demanding the release of prisoners.

Key Aviation Conventions

Three conventions are relevant to the hijacking of aircraft. The 1963 Tokyo Convention relates to acts that might jeopardize the safety of persons or property on board a civilian aircraft while in flight or otherwise engaged in international air navigation. The 1970 Hague Convention, the Suppression of Unlawful Seizure of Aircraft, deals specifically with the hijacking of civilian aircraft in flight and provides guidelines for what is expected of governments in dealing with hijackings. Finally, the 1971 Montreal Convention, the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation, covers attacks on, or sabotage to, civilian aircraft either in flight or on the ground. Jurisdiction can be exercised either by the state in which the hijacked aircraft lands or the state to which the hijacked aircraft belongs. Refusal to extradite hijackers is justified if the offense is claimed to be political, for example, if the hijackers are fleeing a repressive regime and seeking asylum, or the country seeking the extradition has the death penalty, but then the state in which the plane lands is obliged to prosecute.

Historical Hijackings: Planes, Trains, and Ships

Although the first recorded hijack attempt was as far back as 1931, hijacking only became relatively popular with the advent of various terrorist groups around the world in the late 1950s. The worst hijacking, in terms of casualties, occurred on September 11, 2011 (9/11), when 19 al Qaeda terrorists hijacked four planes but, rather than using the hostages as a bargaining tool, they used the aircraft to gain maximum publicity by deliberately flying the planes into iconic targets and thereby sustaining mass casualties; in this case almost 3,000 people died.

However, this was not the only occasion on which multiple hijackings occurred. In September 1970, four airliners, all bound for New York, were seized by hijackers belonging to the People's Front for the Liberation of Palestine (PFLP). Three of these were a TWA Boeing 707, with 149 people on board; an El Al Boeing 707, with 142 people on board; and a Swiss Air DC-8, with 155 people on board. When two of the four terrorists who were due to seize the El Al plane were prevented from boarding that flight, they promptly boarded a Pan Am 747, with 173 passengers on board. Not everything went according to plan for the hijackers. One of the two hijackers on the El Al plane, Patrick Arguello, was shot and killed by an Israeli sky marshal; the other, Leila Khaled, was subdued, and the plane landed in London, where she was taken into custody. In response to the detention of Leila Khaled, PFLP sympathizers hijacked a BOAC VC 10, with 114 people on board, three days later. With the exception of the Pan Am 747, which was flown to Cairo, the planes were flown to Dawson's Field in Jordan, where they were blown up. All the hostages were eventually freed. Khaled was freed by the British government on September 30 in exchange for the safe return of the hostages from the British aircraft.

Prior to the events of 9/11, air crew were normally expected to adopt the approved Federal Aviation Administration (FAA) tactic, which was to comply with the hijacker's demands and attempt to land the plane safely for security forces to deal with the situation. However, this was clearly inappropriate when faced with the circumstances of 9/11, where the hijackers were on a suicide mission. Instead, following that crisis, new procedures were brought in that required cockpit doors to be strengthened and to be kept locked throughout the flight. Closed-circuit television cameras allow the cockpit crew to see what is happening in the area immediately around the cockpit doors. In the event of a plane being hijacked, threats to the cabin crew and passengers will be ignored by the cockpit crew and the plane will immediately be flown to the nearest airport that has a counter-hijack capability.

Many airports have a designated area to which, if possible, the aircraft will be directed once it has landed. In order to prevent a repeat of 9/11, a number of countries have introduced plans, using military aircraft, to shoot down a plane if it is believed to be on a suicide mission, even though this would almost certainly result in the death of all the passengers onboard.

Hijackings are not confined to aircraft. In 1975, South Moluccan terrorists, seeking independence from Indonesia, hijacked a train, with approximately 50 people on board, in the Netherlands. The hijackers surrendered 12 days later after killing three of the hostages. In 1985, the *Achille Lauro* cruise liner, with 400 people on board, was hijacked by four members of the Palestine Liberation Front (PLF), who threatened to kill everyone on board if Israel did not release 50 Palestinian prisoners. After being refused permission to dock at Tartus, the hijackers killed a disabled American passenger and threw his body overboard. The hijackers were persuaded to surrender to the Egyptian authorities when the ship docked in Alexandria.

The hijacking of shipping should not be confused with piracy, where the motive is generally purely financial. Finally, reference is sometimes made to a computer system being hijacked when someone attacks it in such a way that it fails to deliver the service it was designed to, or the attacker takes control of the system to exploit it.

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See Also: Air Traffic Control; Air Travel, Hostage Taking and Negotiation; Perimeter Control; Terrorism; Transportation Security.

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Historical Analogies, Use of

When disasters strike, people often search their memories for a "historical analogy"—typically referencing their memories about past disasters and how others responded to try to find a way to deal with the sense of loss and confusion that occurs following a disaster. This search for historical knowledge is shared by the public as well as disaster responders and policy makers. Disaster responders will use their collective knowledge to determine the best form of response to a given disaster; for example, where and how to enter an area that has been devastated by an earthquake without triggering subsequent damage (e.g., gas explosions, structures collapsing) and provide aid to those who are most in need. Similarly, policy makers use historical analogies to evaluate their policy options and determine how to respond to a disaster. Local, state, and federal policy makers learned of the need to change their disaster response policies after Hurricane Katrina in 2005, when it became clear that each level of government was not prepared for a large-scale disaster. People were stranded for days after the storm, suffering from a lack of drinking water and food. Poor sanitary conditions and crowding at relief facilities exacerbated exhaustion and acts of violence. Public outrage, combined with policy makers' recognition that changes had to be made in disaster response planning, led to large-scale revamping of how local, state, and federal governments work together during a disaster in the United States.

The term *use of historical analogies* refers to obtaining information on past disasters that have affected an area to better understand the probability of similar disasters striking the area in the future. Scientists and planners examine a variety of historical sources to obtain an understanding of the frequency of occurrence of past disasters, their magnitude, and the spatial extent of damage induced by these disasters. The following sections describe the use of historical records (including paleoenvironmental data) for obtaining an understanding of the types of disasters that repeatedly affect an area, as well as discuss the principle of disaster risk reduction planning. Finally, an examination of the history of flooding on the Mississippi River is provided to highlight the impacts of repeated disasters to a national and international economy and to illustrate how government agencies can use historical data to advise changes in policy and create a safer environment for their citizens.

Reconstructing Disasters to Inform Planning

Historical analogies can provide insight into the types of disasters that typically occur in a region, the frequency with which they occur, and the range in magnitude of these disasters. Records of these historical events can also be examined

Case Study: Historical Mississippi River Flooding

The Mississippi River is one of the largest rivers in the world. The river originates in the northern reaches of the state of Minnesota and runs for 2,300 miles (3,680 kilometers) through or along the borders of 10 states until it discharges in the Gulf of Mexico, near New Orleans, Louisiana. The Mississippi River watershed covers more than 1.2 million square miles (3.2 million square kilometers), draining 31 states in the United States and two Canadian provinces; it is considered the fourth-largest drainage basin in the world. Ever since prehistoric times, the river has served as a primary route for trade and commerce, as well as for growing rich crops in the alluvial soils of the river basin. In the first part of the 21st century, crops grown in the Mississippi River basin provided roughly 90 percent of the United States' agricultural exports; the feed grains and soybeans grown here comprise 78 percent of the world's exports in these resources. The barge system has been established along the river, and its port in south Louisiana is one of the largest ports in the world, in terms of the tonnage of goods that move through the system. A variety of goods are shipped through the Lower Mississippi, including chemicals, coal, coffee, edible oils, grain, paper, rubber, wood, iron and steel, and petroleum and petroleum products.

The Mississippi River is clearly a focal point for the livelihoods and lives of millions of people in the United States and also has a significant impact on international commerce. Correspondingly, when major flooding occurs on the Mississippi River that damages or destroys agricultural lands, the homes of farmers, businesses, and industrial plants, there is a significant economic impact on the region and on the world. Following damaging flooding along the Lower Mississippi in 1849 and 1850, the U.S. Congress passed legislation to have the topography and hydrography of the river delta studied, built a navigation channel in the river mouth, and developed a levees-only policy to help control floodwaters on the river.

The river already had a known history of flooding, with severe floods recorded on the Lower Mississippi in 1734, 1735, 1788, 1809, and 1825, and the U.S. Army Corps of Engineers hoped that the flood control measures it was implementing would reduce the damages from the recurrent flooding. Despite its efforts, severe flooding of the Lower Mississippi occurred in 1882, 1912, and 1913, damaging many of the levees and flooding the river valley. In response to the floods of 1912 and 1913, the U.S. Congress passed a flood control act in 1916. The act required the construction of more levees to control flooding along the river, but again the force of the river proved too great. In 1927, a severe flood resulted in the deaths of 500 people, inundation of 16 million acres, and damage to thousands of homes and businesses.

In response to the devastating flood, in 1928 Congress passed another flood control act, which ultimately led to the Mississippi River and Tributaries Project; this program incorporated channelization and stabilization of some portions of the river to increase the river's capacity to carry floodwaters without spilling over its banks or the levees. The program also increased the navigability of the river, which further enhanced the role of the Mississippi River in the development of U.S. international trade.

For the next 66 years, although the river was far better contained than it had been in the past, it continued to routinely crest its banks and top or destroy the levees. Flooding occurred in 1929, 1932, 1935, 1937, 1944, 1945, 1950, 1973, 1975, 1979, 1983, and 1993. In addition to being devastating to the people impacted by the floods, all of the floods resulted in severe economic losses to the U.S. economy. The flood of 1993, however, was so damaging that it changed the way that the Federal Emergency Management Agency (FEMA) managed disasters in the United States. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, FEMA provided logistical and financial assistance to government agencies and individuals impacted by disasters that were declared national disasters by the president of the United States. The 1993 flood directly impacted the states on the Upper Mississippi River, flooding 75 communities, destroying 50,000 homes, and killing 52 people. On the Upper

Mississippi River, 80 percent of the levees were destroyed, and in St. Louis, Missouri, the river was 50 feet above flood stage for more than 100 days. The overall economic impact to the U.S. economy was nearly $20 billion.

The repeated history of flooding on the Mississippi River and extensive damage caused by these floods to the U.S. economy, in addition to the loss of lives, resulted in the development of the Disaster Mitigation Act of 2000 (DMA 2000). The DMA requires all tribes and local and state governments to develop a pre-disaster hazard mitigation plan (HMP) that identifies all natural disasters that are a potential threat to critical assets, such as hospitals, fire stations, schools, wastewater treatment plants, and water sources. Pre-disaster mitigation measures are identified and implemented to reduce the potential destructive force of future disasters. FEMA provides grants to assist the jurisdictions with the cost of developing and implementing the HMPs and their associated mitigation measures, recognizing that for every $1 spent on pre-disaster mitigation, $5 to $7 are spent on recovery. FEMA also encourages landowners to move homes and assets out of the floodplain and leave the river valley for agricultural production, exclusively. Although flooding continues to plague the Mississippi River, as a result of DMA 2000, there are far fewer critical assets located in the floodplain, and mitigation measures are in place to help protect the assets that remain. Correspondingly, the economic impact of flooding is less severe than it would be otherwise, and far fewer lives are lost.

to determine the type of damage typically associated with them, as well as its extent. A variety of sources can be examined to obtain information on past disasters that have affected an area. Good sources for historical data include archival sources (newspapers, magazines, newsreels), academic journal articles, and historical climate records. Researchers can also interview scholars knowledgeable about certain types of disasters, as well as residents who have lived in an area for an extended period of time, to obtain important information on the types of disasters that have occurred in an area in the past. For example, there is very good historical documentation of 20th-century hurricanes along the United States Gulf Coast, from the Galveston hurricane of 1900 to Hurricane Andrew of 1992. This information could have been used more fully to inform development plans and disaster response plans in the region, potentially minimizing the impact of devastating hurricanes such as Katrina.

Limitations of Historical Data

When historical data are used to inform planning and development decisions, it is important to corroborate evidence using as many lines of evidence as possible. Historical data can be flawed if the information was documented incorrectly, or if the equipment or instruments used to gather the original data were of poor quality or were not calibrated against a reliable/verifiable instrument. For example, caution should be used when using historical climate data for a region to determine conditions leading to past droughts, flooding, hurricanes, intensive storms, and tornadoes. Oftentimes, meteorological equipment used to measure temperature, precipitation, humidity, and wind speed and direction are poorly managed and there are many days of missing records, or the units of measurement are inconsistent. Too often, these data are still used to describe past climate conditions, and averaging is used to fill in the gaps, which can result in extreme events being missed entirely. As such, historical newspapers and archival and eyewitness accounts should be examined in an effort to verify past climate conditions leading up to or immediately following a climate-induced disaster.

In addition to concerns over the accuracy of historical records, historical data are often limited by the length of the record (often less than 10 years in developing rural areas), or the records are for a region several miles from the area in question. To fill the gap created by an absence of historical data, scientists can turn to physical evidence of past disasters that can be derived from

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A hog in rural St. Louis, Missouri, is rescued from floodwater during record Mississippi River flooding, July 9, 1993. A total of 534 counties in nine states were declared disaster areas for federal disaster aid, and 168,340 people registered for federal assistance. The Mississippi flood of 1993 provided a historical analogy so significant that it prompted the Federal Emergency Management Agency (FEMA) to change the way it managed disasters in America. The devastation spurred the development of the Disaster Mitigation Act of 2000.

an examination of geographic features on the landscape, as well as other forms of proxy data.

Using Geographic Landscape and Proxy Data

A range of geographic features can provide insight into past disasters that have occurred in an area. For example, the frequency of past flood events can be reconstructed by analyzing deposits left behind by the floods, such as river bars, slackwater deposits, and debris. Erosional scars and terraces carved out of the valley sediment are also indicators of past flood events, as are scars on trees. Similarly, ancient mudslides, landslides, and rockslides can be reconstructed by an examination of the physical landscape, and evidence of ancient wildfires is indicated by lenses of ash and charcoal in sedimentary deposits and as scarring in tree rings. For coastal communities, the height of ancient sea level can be reconstructed from ancient beach terraces and relict corals and correlated to past climatic conditions using a range of techniques.

It is important to recognize that different types of proxy data have different temporal and spatial resolution. For example, tree rings can be used to reconstruct seasonal and annual climate variation in a specific region extending back thousands of years, and forcing mechanisms for the climate variations can also be identified (such as sun spot cycles and volcanic explosions). Tree rings can also be used to reconstruct drought events, wildfires, and flood episodes. Accordingly, trees and tree rings can be used to reconstruct the frequency of certain types of disasters that have occurred within a region extending well beyond the length of most historical records. Tree ring data have high enough resolution (spatially and temporally) that the disaster and climate data derived from them can reliably be used to estimate the frequency with which similar disasters and climatic conditions will be repeated in the future.

In contrast, reconstructions of historic and prehistoric flood episodes from an examination of slackwater deposits on relict river terraces and floodplains are limited by the potential for evidence of ancient floods being destroyed by more recent floods, with past flood deposits literally being washed away. Additionally, the timing of past flood events is more difficult to establish using an examination of slackwater deposits because organic material must be dated using radiocarbon methods, which are rarely accurate to within 50 years of the actual event.

Despite problems with the temporal resolution of proxy data, scientists can establish a longer record of disasters that have occurred in an area in the past. This information can be used to better understand the frequency with which different disasters occur and the underlying conditions that led to them. By obtaining a longer record of past disasters, governments and planners can predict with greater accuracy the potential for certain types of disasters to affect an area in the future. Given that many disasters are induced by climate (for example, flooding, tornadoes, hurricanes, and typhoons), understanding how past climate change affected the various environments of all of the continents is critical for understanding how future climate change may affect these environments. Reconstructions of environmental conditions associated with past climates have been undertaken by multiple scientists and is too extensive a topic to cover here. However, these scientists also use proxy data to reconstruct past climatic and environmental conditions. Proxy data are used under the principle of uniformitarianism, which postulates that the relationships between climatic conditions and environmental response (e.g., precipitation, temperature, and days of sunshine required to grow certain species of plants) have operated unchanged throughout the period of interest.

Historical Data in Risk Reduction Planning

The information on past disasters derived from an analysis of historical data, and potentially proxy data, should be entered into a database and a GIS. After the historical data for all of the disasters have been recorded for an area, they can be analyzed to determine the frequency, magnitude, and extent of damage caused by the different types of disasters that occur in the area. Use of a GIS or hand-drawn maps is important for understanding how past disasters affected the historical landscape. For example, if an area is routinely impacted by flooding, one can rest assured that in the absence of water control projects, future flooding will occur in that area.

In addition to having knowledge of the types of disasters that historically affect an area, it is critical to understand the conditions that make it possible for the disaster to occur and the causal mechanisms of the disasters. To obtain this understanding, experts in various sciences should be consulted. For example, to understand the potential for an earthquake to occur in a region in the future, fault lines should be mapped relative to the regional geology and analyzed by geologists to determine how active they are, as well as to identify the shaking potential of the geologic substrate (rocks and sediments) in the region. The data derived from this analysis should be mapped in a GIS, and the information on historical disaster events in the region should be included as metadata in the GIS. With this information combined in a GIS, analysts can estimate the probability (high, medium, low) and extent of future disasters occurring in a region.

Conclusion

In the most ideal sense, historical analogies can be used to determine where it is safe to live: above flood zones, away from fault lines, and outside tsunami impact zones and areas susceptible to hurricanes, typhoons, tornadoes, and drought. However, in light of population pressure and economic pressures, it is not possible for the entire global population to live in areas deemed disaster free. Given these pressures, and the corresponding need for people to live near centers of commerce, historical analogies can be used to identify repeated disaster threats and the adaptive strategies than can help minimize risks to these threats.

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See Also: All-Hazards; Bureau for Crisis Prevention and Recovery, UN (UNDP–BCPR); Cascading Crisis; Crisis Simulations; Critical Infrastructure; Dams, Levees, and Seawalls; Disaster Recovery; Disaster Risk Reduction; Emergency Management Agencies, City and County; Federal Emergency Management Agency (FEMA); Pre-Impact Planning Process; Risk Analysis.

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HIV/AIDS Epidemic

HIV is the acronym for human immunodeficiency virus (HIV), a lentivirus that binds to cluster of differentiation four (CD4), a membrane protein of helper thymus (T) cells, which are responsible for coordinating immune responses against antigens in the human body. AIDS is the acronym for acquired immune deficiency syndrome, an infectious disease of the immune system that, left untreated, results in opportunistic infections and death. AIDS is a clinical diagnosis of the human immunodeficiency virus (HIV). A healthy individual has approximately 1,200 CD4 helper T cells per microliter of blood; however, upon HIV infection, this count decline. It is not until the CD4 count drops below 200 that an individual is clinically diagnosed with AIDS. CD4 counts below 200 substantially increase the likelihood of opportunistic infections affecting the digestive, integumentary, nervous, and respiratory systems, which may culminate in death. HIV/AIDS is not transmitted through casual contact or mosquitoes but through unprotected anal, oral, or vaginal intercourse; cutting; or sharing of contaminated needles or related products; contaminated blood products; or from mother to child during birth or following through breast milk.

HIV: From Epidemic to Pandemic

From the time that HIV was first diagnosed in 1981 in the United States among a group of previously healthy men who had sex with men, the disease has developed from an epidemic to a pandemic. An epidemic occurs when five or more people are affected by the same disease in a relatively concentrated geographic area in a short period of time. As researchers became increasingly aware of the symptoms, it soon became clear that HIV had become a pandemic. A pandemic occurs when a substantial number of people are affected by the same disease at relatively the same time in a diffuse geographic area. Today, HIV is a global pandemic that has killed more than 33 million people, with mortality in the range of two million annually.

HIV the disease remains a major challenge to development and growth in certain regions of the world. In Africa, most notably in sub-Saharan Africa, where the earliest cases of HIV were retroactively discovered, the disease has resulted in the single greatest reversal of human development in history. Today, an estimated 31 percent of all new diagnoses of HIV and 34 percent of all persons living with HIV reside in the 10 southernmost countries in Africa. Despite these staggeringly high rates of incidence and prevalence, both rates appear to have peaked in the middle 1990s, and rates of infection have declined by more than 25 percent in the region over the past decade.

For example, in Botswana, the nation with once the highest HIV prevalence rate, antiretroviral therapy coverage now exceeds 90 percent and the estimated number of AIDS-related deaths has declined by half. Similarly, Swaziland, the nation with the highest HIV prevalence at 25 percent, has also seen declines in the prevalence of HIV as 80 percent of infected mothers are now on antiretrovirals to prevent mother-to-child transmission.

While a substantial amount of public attention and resources have been dedicated to ameliorating the effects of HIV in Africa, the disease has profoundly impacted other areas of the world, particularly developing regions such as South America and southeast Asia, where commercial sex work and intravenous drug use are common vectors for transmission. In these regions, HIV was on the rise in the 1990s and the first decade of the 21st century, but the incidence has stabilized, with some notable exceptions such as Haiti and Indonesia. Globally, the largest contributing factors to the stabilization and, in some regions, decline in mortality-related HIV has been the introduction of antiretroviral therapies and comprehensive education and risk-reduction measures, most notably safer sex practices. Elsewhere, in China and India, where HIV prevalence represents less than 1 percent of the total population, surveillance, public awareness, and intervention remain critical, as a 1 percent increase in the prevalence rate would result in an additional 24 million new infections, or an approximate 40 percent increase of the total number of current HIV cases.

Conceptualization of HIV as a Crisis

Since the initial recognition of HIV, various media sources, researchers, and policy makers have attempted to frame the disease as a crisis. A crisis is a type of social change where individuals, organizations, and society face widespread exceptions over a relatively short duration. Crises often serve as focusing events for media, the public, and policy makers to pay attention to a certain problem and attempt to resolve the problem through some sort of collective action. Thus, a key component of a crisis is the relatively short duration when the exception occurs, media and the public pay attention, and policy makers are willing to dedicate time and resources to attempt to resolve the problem. Legally, a state of crisis dates back to at least the Romans, where the state could exercise emergency powers, nearly always for a short period of time, in order to resolve a problem.

Like many other purported crises, HIV, it is reasoned, must be dealt with in the same manner because if resources are not effectively allocated, the disease may cascade into a broad social problem that will threaten the legitimacy of political, economic, and sociocultural systems for a particular society or region. Although proponents of this approach may acknowledge that there is very little destruction to physical structures or resources, the same can be said of other problems such as disasters like a nuclear reactor leak, a heat wave, or a bioterrorist incident. Although the aforementioned claims provide some compelling evidence for why HIV should be conceptualized as a crisis, these approaches are generally inconsistent with traditional and contemporary conceptualizations of crisis, as they often overlook important distinctions between long-term implications of HIV.

Some of these distinctions include the importance of exception origin, speed of exception disruption, and policy consequences of crisis conceptualization. Generally, a crisis emanates from a single source of exception, resulting in a cascade of exceptions to individuals, organizations, and communities. In contrast, the long latency of HIV and the need for a critical mass of incidences to generate exceptional social change makes it problematic for members of societies to recognize the threat and take appropriate action beforehand. Although it is possible for some community members to reflect back to a point in time before the onset, it should be noted that this response is qualitatively different from that of most other crises that frequently produce responses immediately or shortly after a collective acknowledgment of the onset of social disruption. These conceptual differences are not merely arbitrary academic distinctions but represent profound policy-making consequences.

Traditionally, occasions that are conceptualized as crises result in widespread short-term media attention, a rapid influx of financial and material resources, and declarations or proclamations by politicians that are often followed by relatively short-term assistance designed to restore, rebuild, or renovate presumably what was lost as a result of the disaster. Although the relatively intense and short-term focus by media, the public, and policy makers may be modestly effective in resolving the challenges of rapid-onset, singular-origin exceptions, such an approach is largely ineffective against the challenges emanating from HIV. For example, in most crises, the physical or economic consequences are very short in onset, and health care infrastructure and resources are most likely to be challenged in the short term until additional resources can be established for those in need. In sharp contrast, the onset of HIV in a community frequently requires a sustained commitment to the development and expansion of heathcare facilities as well as additional personnel in the form of epidemiologists, case managers, and community outreach specialists. Similarly, a sustained effort by media and public officials may also be required to inform and remind the public of risky behaviors that can lead to the transmission of HIV. Without long-term commitments to infrastructure and comprehensive programs focused on economic development, surveillance, public awareness, and interventions designed to reduce transmission, HIV is likely to remain an exceptional disruption for an impacted community.

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See Also: Crisis, Definition of; Epidemics; Pandemics; Public Health Surveillance.

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Hospital Emergency Room

A crisis can be defined as any occurrence that is perceived by an individual to serve as a direct or indirect threat. That threat can be a tangible one, such as physical harm to a person or property, or an intangible one, such as damage to business operations or a personal or institutional reputation. Crisis management in the emergency department (ED) is a methodology that prepares for, responds to, and recovers from any unusual incident that has the potential to negatively impact the normal operations of the ED and its parent health care institution. The term *crisis management* is commonly confused with risk assessment. However, the starting point of the two is considerably different. With risk analysis, the focus centers upon mitigating any potential situation or hazard that could compromise the ED. With crisis management, however, the focus is to develop an appropriate response when that unusual event happens or is likely to happen.

The ED occupies a unique position in a community. It sits at the crossroads between the pre-hospital health care environment (emergency medical services [EMS], clinicians' offices, and clinics) and the health care institution that harbors that ED. It is the traditional terminus of emergency care for all varieties of illnesses, accidents, and disasters that may befall a community, and it is the initial stabilizer of major medical/surgical conditions entering into the hospital. As such, it, as well as its physicians, nurses, and ancillary personnel, enjoys the community's respect and trust. In an era of terrorist threats, environmental catastrophes, and a fracturing health care system, it remains a beacon of safety, care, and hope regardless of one's race, ethnicity, or socioeconomic status. Therefore, for the good not only of the ED and hospital, but also for the general well-being of a community, it is incumbent upon the ED to identify potential crises and develop procedures and guidelines that will facilitate a proper response to and recovery from adverse events in such a way as to preserve its continuity of operations, maintain the confidence of the community, and ensure that a similar event will be less likely to occur in the future.

In order to manage a crisis with regard to the ED, one must first understand the full implications of what a crisis is, given the ED's position within that community's health care framework. The crisis may be categorized in several different ways:

1. Quality
   a. Acute: The event occurs abruptly, with little or no forewarning; examples: a bomb threat or a suicide in the department.
   b. Chronic: The event is occurring for a time and may threaten the ED; example: a wildfire.
2. Geographical location of the crisis
   a. Internal/institutional
      i. Intradepartmental: The crisis is strictly limited to the ED; example: the unexpected death of an infant patient.
      ii. Extradepartmental: The crisis directly and indirectly involves the entire institution; example: the unexpected arrival of a VIP as visitor or patient.
   b. External/community
      i. General: The crisis involves the entire community in which the ED and hospital reside or even a jurisdiction that is contiguous to the particular ED; example: a magnitude 6 earthquake.
      ii. Agency-specific: The crisis occurs at another agency that could seriously impact the functionality of the ED; example: closure of a mental health crisis agency for lack of funding.
3. Temporal
   a. Completed: The crisis is concluded, and response and recovery phases are ongoing; example: meltdown of a local nuclear power plant.
   b. Imminent: The crisis is tangible, and planning an appropriate response takes precedence; example: the first bands of weather from a category 5 hurricane are palpable.
   c. Active: The crisis is ongoing; example: sudden loss of power in the hospital.
   d. Remote: The crisis exists elsewhere, but it is questionable as to its relation

Case Study: Improvised Crisis Management With Hospital Emergency Staff

There are occasions where even the most comprehensive plan is insufficient. In the early morning hours of December 26, a very well-regarded, well-liked emergency department (ED) nurse volunteered to work in the ED by 0300. As she was driving in, an inebriated driver driving in the wrong direction plowed into the nurse's vehicle, killing her instantly. Within a matter of an hour or so, the ED director was notified. She immediately came in to meet with her staff, provide physical and emotional support, monitor their patient-care activities, and notify the hospital administrators. While the chief nursing officer activated a modified incident command system (ICS) directing hospital staff notification and deflecting media inquiries to the public information officer (PIO), the ED director personally contacted the entire ED staff not currently at work and began making arrangements for counselor support and critical incident stress debriefings. She served as a conduit of information between the deceased's family and the ED.

The nurse arranged for nursing staff from other EDs to temporarily replace the staff so that fellow workers could attend the wake and the funeral. In order for this new staff to function efficiently, she provided "just-in-time" training and created improvised instructional material in order to familiarize the volunteer staff with the workings of the department. After that first week, the management of the situation went from crisis to resolution as staff employees availed themselves of counseling and participated in memorial services, tributes, and a permanent dedication that were in large part developed by the director. It required two months of the director's steady leadership and organizational and communication skills to help the ED staff find closure, despite the ED director's own sorrow and sense of personal loss.

    to ED operations; example: a major meningitis outbreak in a nearby community.

4. Nature of the crisis
    a. Natural
        i. Infectious: Examples include local meningococcal meningitis outbreak or a pandemic.
        ii. Environmental: Example would include an extreme thermal event (heat wave or ice storm).
    b. Human-made
        i. Accidental
            1. Technological: Example would be a grain silo explosion.
            2. Natural-technological: A classic example is the Fukushima, Japan, earthquake-tsunami-nuclear accident triad.
        ii. Intentional
            1. Terrorism: An example would be a dirty bomb detonation.
            2. Lone perpetrator: An example could be a hostage situation.
            3. Gang-generated: For example, a gang war.
5. Duration of the crisis (presumed)
    a. Short-term: Hours to a day (e.g., fire).
    b. Intermediate: Days to several weeks (e.g., hurricane).
    c. Long-term: Months to years (e.g., severe pandemic).
6. Population affected
    a. Numbers
        i. Limited (e.g., one to several individuals)
        ii. Extensive (e.g., most of the jurisdictional public)
    b. Status
        i. VIP (e.g., presidential visit; assassination attempt)

Recognizing that the ED can be negatively impacted by virtually any crisis that happens within the department, the institution, or the community and employing the schema above as a guide allows the ED to maintain a certain degree of flexibility within a structured format. It allows recognition of situations as diverse as a suicide in an ED bathroom facility, a hostage crisis in the hospital cafeteria, a tornado strike downtown, or a botulism mass-casualty incident.

The steps that are required to manage a crisis successfully include the following:

1. Hazard vulnerability analysis
2. Policy and procedure development/review/revision
3. Education of staff and personnel
4. Crisis recognition
5. Leadership (Hospital Incident Command System)
6. Notification
7. Communication
8. Recovery
9. Debriefing
10. Restart the process

Many of these steps and activities are already in place for emergency departments, because each one must meet Joint Commission on Accreditation of Healthcare Organizations (JCAHO) disaster management requirements. However, within that framework, the success or failure of a response to a crisis will largely depend on the leadership skills of key personnel within the ED and their ability to communicate calmly and clearly to staff, administrators, the media, and the public at large. That communication must be clear, forceful, honest, and transparent to all. Any attempt to minimize or deceive can have disastrous consequences on the integrity not only of the ED but also of its hospital. Although this may be theoretically acceptable to most, the chinks in the ED armor may not be obvious until policies and procedures are tested via drills and exercises.

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See Also: Crisis, Definition of; Emergency Medical Care; Emergency Medicine; Emergency Responders; Preparedness; Response.

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Hostage Taking and Negotiation

Hostages have been taken in order to seek some advantage since the Roman Empire. But it was the poor handling of two incidents, one in the United States and one in Europe, that finally brought about a more professional approach in the response to hostage taking. At New York's Attica state prison in the United States in 1971, inmates took control of the prison, taking staff hostage. In regaining control, 39 people were killed, including 10 staff. The following year, in an attack by eight members of a Palestinian group, Black September, on the Israeli team quarters at the Munich Olympics in Germany, two Israeli athletes were killed and eight were taken hostage. An abortive attempt by German security forces to free the hostages at a nearby airfield left all eight Israeli hostages and five of the terrorists dead; three survived. A German police officer was also killed. Following these two incidents, many countries identified, first, the need to train negotiators, primarily in law enforcement agencies, to attempt to bring about the release of hostages unharmed. Second, they immediately started training special units, both law enforcement and military, to rescue hostages if the need arose.

Hostages are people held against their will by an individual or a group, usually for the purpose of fulfilling certain demands. By virtue of Articles 1 and 2 of the International Convention Against the Taking of Hostages, adopted by the United Nations General Assembly on December 17, 1979, it is an offense for a person to attempt to commit an act of hostage taking or to be an accomplice in an act in which hostages are seized or an attempt is made to seize them. A hostage taker is a person who has taken hostages against their will and is threatening to commit acts of violence against them. The *stronghold* is the term given by law enforcement agencies to the premises in which a hostage taker is holding hostages. A negotiator is a person who negotiates with the hostage taker(s) for the release of the person(s) they have taken hostage.

Americans held hostage in Iran disembark Freedom One *upon their arrival at Andrews Air Force Base, January 27, 1981. In a diplomatic crisis, 52 Americans were held for 444 days from November 4, 1979, to January 20, 1981.*

Next to the overall commander, negotiators are probably the most important people in responding to a hostage incident. The priorities of the negotiator, in a liberal democracy, are to save the lives of the hostages and, if possible, to save the lives of the hostage takers and to gain intelligence for the officer in command of the incident. Negotiators are trained "to play for time" by slowing things down for four reasons. The first is to allow what is known as Stockholm Syndrome to develop. This phenomenon arose when four employees who had been held at gunpoint by two criminals for six days in a Stockholm bank in which they worked declared their loyalty to the hostage takers. Second, during the early stages, when adrenalin is high in both the hostage takers and the hostages, it is hoped that time will allow them to become more rational. Third, it is important to gain intelligence in case negotiations fail and it becomes necessary to assault the stronghold. Finally, it enables the law enforcement agencies to gain the initiative.

There is a generally recognized list of items that are negotiable. They are food and nonalcoholic drinks, cigarettes, money, publicity, and freedom for the hostages. Transport can also be a negotiable commodity, providing it does not take the hostage takers outside the law enforcement's jurisdiction. What is not negotiable are alcohol, an exchange of hostages—perhaps a more high-profile person than those who are currently held—the supply of weapons, the release of prisoners, or the replacement of a law enforcement negotiator by a civilian negotiator.

Negotiators are normally middle-ranking law enforcement officers; thus, they are not in command and do not make instant decisions, and any requests or demands by the hostage taker(s) are referred upward to the overall commander. Demands are a basis for trade and, therefore, for every demand made by the hostage taker(s), the negotiator is looking for a trade-off (e.g., perhaps the release of a hostage or hostages in exchange for additional publicity). If a demand is dependent on a third party, and particularly if that third party is in another country in a different time zone, that is sometimes an opportunity for the negotiator to start sowing seeds of doubt in the mind of the hostage taker(s) in an effort to bring about a peaceful solution. Should negotiations break down or the hostage taker(s) start killing the hostages, even though negotiations are still ongoing, it may be necessary for the specialist team (invariably law enforcement or military) to assault the stronghold in order to rescue the remaining hostages. The assault should be carried out with speed, using diversions as necessary.

In most cases, the management of the incident will be entirely in the hands of the law enforcement agencies or diplomats, and civilian crisis managers will have little or no say in how the operations are conducted. However, in those cases that have international implications involving the use of negotiators from specialist private companies, crisis managers should lay down clear parameters, particularly in what they are prepared to exchange for the release of the hostage(s). In some cases, this can involve large sums of money or extraordinary demands.

There have been a number of well-publicized incidents in which hostages have been seized and held in areas that are inaccessible to their country of origin. Terry Anderson, an American; Terry Waite and John McCarthy, from the United Kingdom; and Brian Keenan, who had British and Irish dual nationality, were all taken hostage in Beirut during the 1980s and held in excess of five years. More recently, Ingrid Betancourt was held for over six years by the Revolutionary Armed Forces of Colombia (FARC) until rescued, with 14 other captives, by security forces in Colombia. In such cases, negotiations are carried out at a diplomatic level or are undertaken by a number of specialist private companies that have considerable experience in such operations.

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See Also: Air Travel; Command and Control; Foreign Policy Crises; Hijackings; Marine Travel; National Incident Management System (NIMS); Perimeter Control; Pre-Crisis Training and Planning; Preparedness; Prevention; Terrorism.

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Human Trafficking

Human trafficking refers to the recruitment, movement, and delivery of people from a host to a destination state for the purpose of enslavement and exploitation. This broad definition of human trafficking encompasses various types of exploitation, such as sex trafficking, exploitative work, recruitment of children soldiers, adoption of infants, begging, and organ trafficking. The practice of slavery has been identified since Hammurabi's Code in 1790 B.C.E. However, what has changed since then is the perspective of humanity in terms of human exploitation. Thereby, the 1948 UN Declaration of Human Rights highlights that human slavery is unacceptable. Also, the Protocol of Human Trafficking in 2000 defines as illegal this type of human enslavement and exploitation.

Human Trafficking as a Global Crime

Contemporary trafficking is much more diverse and complex than the slave trade of the past, and it has a global character because every country faces this problem as a source, transit point, and/or destination for human trafficking. The end of the Cold War, globalization, free trade, and economic competition are some of the main factors that led to the greater mobility of products and people. Furthermore, unemployment; population growth; poverty; corruption; gender, ethnic, and racial discrimination; political instability; and natural disasters are some of the main push factors that can be paired with the pull factors of demand for workers, opportunities for a better quality of living, and possibilities to live in a more stable and affluent place. Therefore, demand and supply in the modern world have increased, hence making human trafficking the fastest-growing crime, with enormous profits, which are estimated at $10–$32 billion annually. Beyond the actual criminals who exploit and enslave human beings, there are plenty of legitimate enterprises and citizens that benefit by ignoring this egregious phenomenon. For instance, many people would buy well-priced clothes made by trafficked workers, or they would hire a domestic laborer to take care of their children and homes.

Human Traffickers and Their Practices

The profession of traffickers varies, and they often have high social status and education. Traffickers can be former prostitutes, military and law enforcement personnel, lawyers, diplomats, and employees of multinational organizations. Recruitment techniques vary depending on the level of victims' education, the expectations of the victims and their families, and their financial situation. For instance, traffickers recruit victims from poor families by personal contact, deceiving families that once their debt to the traffickers is paid off, victims will be free to earn their own money. Traffickers often move individuals by long routes and in cruel conditions (e.g., cargo vessels, no medical care) using every known form of transportation and, hence, they need a military-like intelligence network to successfully avoid certain obstacles such as police and border checkpoints. Their activity is often facilitated by a number of other professionals from the legitimate world, such as travel agents, hotel owners, newspaper publishers and advertisers for the promotion of their products and services, and nightclub owners. Trafficking networks often interact with other criminals to obtain falsified documents, arrange false marriages, intimidate the victims of trafficking, and launder their profits.

Trafficking rings often repatriate their profits to neutralize law enforcement, to strengthen their political influence, and to invest in advanced technology so as to intrude into the government structure of their home countries and to make their network more flexible and viable. Other traffickers use their profits to fund terrorist groups or a guerrilla movement. Traffickers often get away with their crimes because in some countries, there is no law criminalizing their practices, the extant regulation is insufficient to combat this problem, or police do not prioritize human trafficking. Even though millions of dollars have been spent in the development of programs for the prevention of and fight against human trafficking, these measures have proven inadequate to resolve this global and deeply rooted issue.

Trafficked Women and Children

Women and girls are often victimized and denied access to education, property rights, and political participation around the world. Some societies view women as tools that can be used to advance a family's economic situation, to repay a family's debt, and to provide cash for a medical emergency.

Other causes that may lead to the victimization of women and children are family homelessness, illness or death of a parent, abandonment by a parent, and alcohol abuse and violence within the family. Traffickers may also offer money to the family for the exploitation of the child or the woman and might also threaten the victims with violent retaliation in case they attempt to escape. Many of the practices that were used during the Holocaust to produce passive victims are replicated by the traffickers. Thereby, children are often maimed to be beggars, deprived of vital organs, recruited as soldiers, and occupied in certain jobs because of their small size. Trafficked women often die, become seriously ill, and/or suffer psychological damage after constant abuse, violence, and intimidation by their traffickers.

Recommended Actions Against Trafficking

Trafficking needs much more basic research in the identification of practices regarding the prevention and combating of this global crime. Media are able to make the public aware of this pervasive phenomenon through popular actors, singers, and journalists. Volunteerism and fund-raising by individuals is also significant. Thereby, people may donate clothes, equipment, and money, and they might even offer their professional and language skills to help victims/survivors of trafficking. People should report to the police human trafficking networks that may come to their attention, hence helping government agencies to uncover trafficking cases, prosecute traffickers, and provide services to victims/survivors of human trafficking.

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See Also: Ethnic Cleansing; Mass Care; Poverty; Refugees and Forced Migration; Trauma.

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Hurricanes, Typhoons, and Cyclones

Cyclones are organized storms that have a circular wind pattern and a defined center (also referred to as an "eye"). Such storms are fueled by energy from warm waters. Hurricanes and typhoons are two specific types of tropical cyclones. The term *hurricane* is used to refer to storms that occur in the Northern Hemisphere and east of the International Date Line (generally affecting areas in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico), while the term *typhoon* refers to tropical cyclones that originate in the western north Pacific Ocean. To be considered a hurricane or typhoon rather than a tropical depression or tropical storm, the storm's maximum sustained surface wind speed must reach at least 74 miles per hour (or 119 kilometers per hour), a level 12 in the Beaufort Wind Force Scale. Winds of this speed cause significant waves, reduced visibility, debris, and damage to both vegetation and some human-made structures.

As wind speed increases in hurricanes, they are moved from a tropical storm into the Saffir-Simpson scale and gradually into higher categories of the scale as wind speeds continue to increase. Tropical storms are those that have sustained wind speeds between 39 and 73 miles per hour. In the Atlantic Ocean, a tropical storm becomes a hurricane when its wind speeds reach over 74 miles per hour. However, it is important to remember that wind speed is not the only potential danger from a hurricane. The power of and potential damage caused by storms can also be measured by pressure ratings (in millibars or inches), size (diameter), and how fast they are moving forward.

Although hurricanes, typhoons, and cyclones can move into colder water, in general they are more likely to remain and gain strength in warmer water, largely within areas considered tropical climates. Air moving within a hurricane gathers heat from these warmer waters, fueling a process wherein some air sinks in the center of the storm and air in the storm's outer bands moves upward and rotates because of the Coriolis force (caused by the Earth's rotation). As these storms gain strength and rotate faster, their wind speeds increase, often leading to their being considered stronger and potentially more dangerous storms.

When storms move over warmer water, they can often increase in power, as was the case with Hurricane Wilma in 2005, a storm that escalated from a tropical storm to a Category 5 hurricane in just 24 hours.

With increasing numbers of people moving into flood zones along rivers and ocean coastlines, crisis management of potential hurricanes, typhoons, and cyclones has become increasingly important. These risks are further complicated by the influx of tourists into those same areas, increasing the number of people in an area that may be hit by a cyclone, including a large number that may not have experienced such a storm before or know what to do or how to evacuate. More and better information about cyclones is emerging from increasing forecasting models. Such information can potentially improve predictions about which populations will be affected, how they will be affected, and whether they should evacuate.

Even with these improved data, cyclone prediction is not perfect and not all potentially affected residents and tourists can or will evacuate; moreover, crisis management is still needed during and after these storms. Crisis and emergency managers should be aware of the latest predictive models emerging from experts like those at the National Hurricane Center (NHC) and the Joint Typhoon Warning Center (JTWC). Furthermore, these managers should be in contact not only with other crisis managers and experts in governmental agencies and nongovernmental organizations but also with private organizations, especially in areas where these private companies cover large land areas or bring in large numbers of people (such as coastal hotels that may contain large numbers of tourists).

Many problems can emerge for crisis managers in the aftermath of cyclones. In addition to emergency response and cleanup needs, in the short term, affected areas and populations may face a lack of resources as even individuals and groups who stockpiled supplies may have lost them to severe winds or storm surges. Immediate medical attention is often needed by injured people who may not be able to get to hospitals or clinics because of missing vehicles or debris blocking roadways. Many individuals and families may be without shelter or work and need assistance finding a place to stay and a source of income. In the long term, local residents often continue to face these problems because recovery may move slowly and some homes and businesses may never be rebuilt.

As with other crises, in the face of hurricanes, typhoons, and cyclones, crisis management should account for vulnerable populations such as the poor, elderly, young, or disabled. Despite the increasing amount of lead time for evacuations afforded by improved predictive models, such populations may not be able to evacuate or care for themselves after a cyclone. Knowing where members of these groups live, whether they have evacuated, and how they are prepared can help crisis managers provide better response and assistance to everyone, particularly the most vulnerable.

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See Also: Dams, Levees, and Seawalls; Disaster, Definition of; Federal Emergency Management Agency (FEMA); Floods; National Oceanic and Atmospheric Administration (NOAA).

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I

Immigration

Following the end of World War II, increased global mobility among people has accelerated rates of globalization to unprecedented levels. Specifically, political, economic, and personal reasons, such as the pursuit of a better lifestyle, have prompted immigrants to relocate from developing nations to seek better opportunities. Not all migrants have moved from developing to developed nations. Nearly 43 percent are migrants from one developing nation to another developing nation, thereby creating unstable demographic transitions in the developing world. In the developed world, restrictive and often racist national and subnational immigration laws in Western nations have created a climate of crisis for incoming immigrants from the developing world. However, not all forms of immigration are across international borders. According to the 2009 Human Development Report prepared by the United Nations Development Programme, nearly 740 million people worldwide are internally displaced within their own national boundaries, compared to around 200 million who migrate across international borders. Other issues of crisis in global immigration include shrinking economies and layoffs that affect migrant workers as well as a draining of knowledge, or "brain drain," of highly skilled workers from their countries of origin. However, improved cooperative agreements between nations with progressive immigration policies as well as reforms at the national level hold keys to alleviating the global immigration crisis.

Types of Crisis Within Immigration

Immigration crises can stem from various institutional (for example, restrictive government policies, both at the national and subnational levels), environmental (for example, natural disasters, climate change), illegal trafficking (for example, human smuggling), and other factors. In addition, the economic crisis of 2008 has exposed newly emerging forms of crisis that were not envisioned before. For example, immigrant workers in Middle Eastern nations, including Qatar and the United Arab Emirates, were faced with the prospect of returning to their homelands because of the collapse of the global housing market. Further, the global economic crisis impacted remittances by immigrants to their beneficiaries in developing nations. According to the World Bank, the 2008 crisis resulted in a drop of over 30 percent of the nearly $340 billion sent by migrant workers to their respective home nations. For countries such as Tajikistan, where remittances from its expatriates amount to nearly 35 percent of the nation's gross domestic product, global economic downturns can severely affect national economies depending on immigrant revenue inflow.

Government and Immigration Crisis

Since the attacks of 9/11, national immigration laws in the United States have undergone major changes, in many cases restricting immigrant inflows. Specifically, laws enacted by southern U.S. states have called into question its legal scope within the limits of civil liberties. For example, the Arizona law, S.B. 1070, signed into law by the Arizona governor, has gained international significance for its controversial monitoring and surveillance of undocumented immigrants, including sanctioning a misdemeanor charge if they are found without immigration papers. Other states, including Alabama and Georgia, have followed the Arizona model, creating a climate of crisis within their immigrant population, particularly those from Latin American nations.

Immigration and Human Trafficking Crises

Climate change has affected every aspect of human behavior, including immigration. The United Nations High Commissioner for Refugees (UNHCR) projected that by 2020, some 50 million migrants worldwide are predicted to move elsewhere in search of better environmental conditions. These "environmental refugees," as noted by the UNHCR, are bound to flee from food shortages, floods, and other environmental disasters brought in by climate change as they migrate from the developing world to developed nations. Among various regions, the largest migration stream is predicted from North Africa and into southern Europe. Worse still, governments in smaller nations on the Pacific Ocean, including the Marshall Islands and Tonga, are making long-term plans to move their citizens to other countries because of rising sea levels predicted to submerge their island nations. In addition to climate change, recent environmental disasters have displaced immigrants from their original migration routes. The 2004 Asian tsunami displaced millions around the Indian Ocean region, forcing several developed nations in the European Union and Pacific Ocean nations, including Australia and Japan, to offer urgent asylum visas to incoming refugees. For example, by March 2005, the Canadian government had placed over 1,000 applications on fast-track processing for immigrants from the tsunami-affected areas.

On July 8, 2011, a woman and her children join the thousands of refugees in the Dadaab camp in Kenya who are fleeing the drought and conflict from Somalia. The United Nations projects 50 million immigrants will be "environmental refugees" by 2020.

Illegal transportation of persons around the world, referred to as human trafficking, is one of the least discussed issues in immigration. According to a U.S. State Department estimate, around 10,000 human beings are trafficked into the United States as sex slaves every year. Russia, Mexico, and China are some of the nations where smugglers force people, often in inhumane conditions, to be transported to other developed nations. In an effort to combat the illegal immigration crisis of human trafficking, nongovernmental organizations have been helpful. Among them, the International Organization for Migration (IOM) has implemented over 500 projects since 1994 to provide assistance to over 15,000 trafficked persons worldwide. Further, in a recent study conducted by the United Nations Office on Drugs and Crime, of 155 nations surveyed on trafficking, 57 percent reported at least one human trafficking prosecution.

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See Also: Border Disputes; Brain Drain; Human Trafficking; International Strategy for Disaster Reduction, UN (UNISDR); Interstate War; Refugees and Forced Migration.

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Impact, Definition of

In the last half of the 20th century, there were increases of 250 percent in the number of recorded disasters, 500 percent in both the number of mass-casualty disasters and the number of people affected by disaster, 1,500 percent in the cost of disasters, and 1,640 percent in insurance reimbursement as a result of disaster, according to the 2000 data compiled by the Munich Re Insurance Company. These trends have continued unabated into the 21st century. However, they are somewhat exaggerated, because in 1950 the collection of statistics on disaster impacts was rudimentary. Moreover, only direct costs were measured, whereas now indirect costs are taken into account. Nevertheless, in 60 years there have been large increases in population and accumulations of capital investment in major hazards zones, especially along coastlines subject to hurricanes, flooding, and potentially sea level rise. Everywhere, the increase in global connectivity and technological complexity has caused vulnerability to disasters to rise and thus has made impacts more profound and complex.

When disaster strikes, these are the principal categories of impact: death, physical and psychological injury, disease outbreaks and other medical conditions, destruction of property and physical damage, economic effects and impacts upon livelihoods, and disruption of normal activities. As measured in the time taken to rebuild physical structures and fully restore normal activities, the impact of a major disaster may last for 10–25 years, depending on the severity of the event, the size of the area affected, and the resources available over time for recovery. There is increasing recognition that the restoration of livelihoods and local economic activities, preferably with democratic participation in decision making (i.e., good, transparent governance), is the key to recovery from disaster.

For convenience of recognition and analysis, the causes of disasters are usually divided into five categories:

- *Natural:* such as earthquakes, floods, hurricanes, landslides
- *Technological:* such as toxic spills, chronic pollution episodes, transportation crashes
- *Social:* such as strikes, demonstrations, riots, mass gatherings
- *Intentional:* such as terrorist attacks, hostage taking
- *Compound or complex:* combinations of the above, such as "na-tech" (natural-technological) disasters

The distinctions are somewhat artificial. To begin with, natural phenomena are not necessarily inherently disastrous. As the human propensity to

Table 1 Nonquantitative classification of levels of emergency

	Incidents	Major incidents	Disasters	Catastrophes
Impact	Very localized	Generally localized	Widespread and severe	Extremely large
Response	Local efforts	Some mutual assistance	Intergovernmental response	Major international response
Plans and procedures	Standard operating procedures	Emergency plans activated	Emergency plans fully activated	Plans potentially overwhelmed
Resources	Local resources	Some outside assistance	Interregional transfer of resources	Local resources overwhelmed
Public involvement	Very little involvement	Mainly not involved	Public very involved	Extensively involved
Recovery	Very few challenges	Few challenges	Major challenges	Massive challenges

put oneself at risk is paramount, and thus vulnerability is the root cause of many natural disasters, the word *natural* is more a convenience term than a robust descriptor. Moreover, there are many process-based links between the categories. For instance, natural disasters may affect technological capital, technology may abate or increase vulnerability to natural disasters, natural disasters may affect social stability, social conditions may help incubate dissidence and thus foster intentional disasters, and terrorism has a technological component.

As Table 1 shows, there are grounds for creating a semantic classification of the size of event on the basis of its geographical extent, its complexity, the nature of the emergency response required, and the degree of involvement of public authorities and the affected population. However, the distinctions between an incident, a major incident, a disaster, and a catastrophe are purely notional: they cannot easily be quantified, and they are not accepted by all of the protagonists in this field. Moreover, other distinctions need to be added to the classification. One of these is between sudden impact events and "creeping" disasters, or slow-onset events. Among the latter, accelerated soil erosion may eventually cause disastrous damage to structures and local food production, but it may take decades to arrive at that point. The sudden-onset disasters vary according to their degree of predictability and forewarning: most earthquakes occur virtually without warning, while storms allow varied propensities for meteorological forecasting that grant lead time for preparation to meet the impact, for example, by sheltering from tornadoes or evacuating in advance of hurricanes. Nonetheless, as Table 2 illustrates, the best way to distinguish size of event is probably in relation to the thresholds of capacity to cope with it at each level of civil administration.

In causal terms, the bases of disaster impact are hazard and vulnerability, which combine to produce risk. Besides the direct cause–effect relationship of extreme phenomena that produce damage and casualties, there are various sources of complexity. Secondary hazards can be triggered by the initial impact; for example, post-earthquake fire. Thus, after the magnitude 7.3 Hanshin-Awaji earthquake at Kobe in Japan on January 17, 1995, 531 seismically induced urban fires broke out, including a major conflagration in a retail precinct. Risks may interact: for example, reservoir dams may be subject to flood, siltation, landslide, rock avalanche, subsidence, structural failure, and spillway failure hazards, in a complex combination of technological and natural causes. Furthermore, on January 11, 2011, an undersea earthquake of magnitude 9 caused a tsunami and nuclear radiation release disaster in eastern Japan, killing 22,600 people and severely damaging or destroying 218,000 buildings. The Tohoku earthquake, or Great Eastern Japan Earthquake and Tsunami (GEJET), focused international attention on cascades, or chains, of causality. In a country where antiseismic construction is the norm, the earthquake itself had limited impact: indeed, it may have killed as few as 100 people. However, time will tell whether the tsunami (and

Table 2 Thresholds of capacity to deal with impacts of various sizes

Local incident	Local response
Threshold of local capacity	
Small regional incident	Coordinated local response
Threshold of intermunicipal capacity	
Major regional incident	Intermunicipal and regional response
Threshold of regional capacity	
National disaster	Intermunicipal, regional, and national response
Threshold of national capacity	
International catastrophe	Intermunicipal, regional, and national response, with more international assistance

associated persistent economic effects) or the contamination of several prefectures with radiation will be the most enduring legacy of the disaster. No matter how large the catastrophe, impact is always primarily local, but as a result of economic linkages, the implications may be international or even global. Hence, GEJET disrupted industrial production in Europe, where components were manufactured for Japanese industry.

One measure of the impact of disaster is its cost in terms of gross national income (GNI). In Japan, comprehensive cost estimates for GEJET suggest that it could reduce GNI by 6 percent, although the effects would be spread over a period of 6–10 years. Normally, in highly developed countries, disasters do not cost more than about 0.2 percent of gross domestic product (GDP). By contrast, in poor countries they may absorb 20 percent or more of GDP. Nonetheless, scenarios for a modern repetition of the 1923 Kanto earthquake with a major impact on Tokyo have suggested that up to half of Japanese GDP could be lost, with knock-on effects around the world financial markets. Such estimates have been criticized as exaggerated. Nevertheless, there is no doubt that insurance, one of the paramount means of transferring risk, does not have a large enough global pool of capital to amortize the effect of a really large catastrophe such as that envisaged in the Tokyo earthquake scenario. Even in the United States, it has been estimated that the National Flood Insurance Program is short a billion dollars with respect to potential losses if epochal floods were to occur.

The context of risk and vulnerability can transform an incident into a disaster or a disaster into a catastrophe. This observation has distinctive connotations for the impact of terrorism. Relatively few people are directly involved in terrorist outrages, but the impact of disruption leads to high costs for society and economic activity. For example, the cost of security has risen from 6 percent of running an airport in 1995 to around 38 percent in the 2010s, regardless of whether terrorist attacks occur or not. Another particular context is that of business continuity management (BCM), in which the impact of an incident or disaster is measured in terms of both physical damage and disruption, on one hand, and potential damage to a firm's reputation on the other. Hence, BCM deals with managing both the incident itself and the communication problems involved with protecting reputation (and thus also, for example, the stock market price of a firm's shares). Terrorism and BCM are two examples from among many that illustrate how context is important to the understanding of impact.

Finally, the protagonists of the United Nations' International Strategy for Disaster Reduction (UNISDR) have worked hard to shift the global emphasis from responding to disasters to reducing and preventing impacts by mitigation. This is the basis of its Hyogo Framework for Action, 2005–2015, whose main priorities include the enhancement of warning processes, the creation of a culture of safety and resilience, the promotion of measures to reduce underlying disaster risk factors, and the strengthening of prior preparedness at all levels. Despite this important endeavor, and whatever strategy succeeds it after 2015, much work needs to be done to shift the balance from the current heavy emphasis upon responding to disasters to one in which preventing and reducing impacts is paramount.

Specific Ways to Consider Impact

Despite attempts to shift the emphasis from response to prevention, there is still a very obvious need to consider impact from the point of view of crisis management. The resources needed to respond adequately to a disaster will be proportional to its severity, complexity, and geographical extent. The difficulties inherent in the response to disaster are a function not only of the nature of the event but also of the degree of prior preparedness, including planning, training, and exercising. Emergency response involves personnel, equipment, consumable supplies, communications, vehicles, and command structures. It requires organization, plans, and standard operating procedures designed to cope with exceptional contingencies. In some respects, from the point of view of the crisis manager, a crisis is merely an interval of time distinguished by the accelerated consumption of goods and services, but in other ways it is a critical period in which everything possible must be done to reduce adverse impacts on human health, society, and economic activities.

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See Also: Catastrophe, Definition of; Damage Assessment; Damage Containment; Debriefing; Disaster, Definition of; Disaster Assessment; Hazard Vulnerability Analysis; Impact Analysis; Losses, Quantitative Versus Qualitative; Multiple Disaster Problem; Reputational Risk; Risk Assessment; Trauma; Uncertainty.

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Impact Analysis

An impact analysis is used primarily when “change” occurs. For crisis management teams (CMT), this means performing an impact analysis—both perceived and hypothetical—to determine the impact of a crisis or disaster. A crisis/disaster is the biggest change that any individual, community, or corporation can experience. How and when is an impact analysis performed, and what aspects need to be considered by the CMT?

The first impact analysis performed by a CMT is usually at the outset or discovery of a crisis. Immediately upon being formally notified of the situation, the team must uncover and determine what the impacts are—both positive and negative, real and hypothetical—on the following:

- Departments/divisions
- Business processes and operations
- Technology systems (information technology [IT] infrastructure)
- Facilities
- Finances/financial institutions/fines
- Vendors/partners/suppliers
- Employees
- Regulatory/legal requirements
- Long-term ramifications
- Service level agreements (SLA) (contracts)
- The general public (for public relations)

Often during a crisis, the impacts of a decision are determined regarding how to immediately resolve, mitigate, or respond to a specific situation,

Case Study: Impact Analysis During the August 2003 Northeast Blackout

The great northeast American blackout of August 2003 is known around the world, among corporations and communities alike. It is known as a defining moment in business continuity, disaster planning, and emergency response processes. Some were able to weather the power outage, and many others were unable to respond effectively.

One such corporation—a leading human resource service provider in Canada—experienced the blackout just like many other corporations, yet when performing an impact analysis with its crisis management team (CMT), it was able to manage the situation and continue operations without missing a single submission deadline.

Immediate Activation of Crisis Management Plan

When the blackout occurred at approximately 4:10 P.M. on August 14, the company immediately activated its incident management/crisis management protocols, which brought together representatives from all major lines of business and senior executives using cellular phones and personal message devices that were not impacted by the power outage.

They immediately set to work performing an impact analysis of what they knew about the situation and which activities, based on the known assessment, could be implemented. The team focused on which facilities were impacted, whether operations within those facilities were operational, and which workload activities could be transferred to locations in other parts of the country that were unaffected by the blackout. Not only did they assess the impact on the nonoperational business units but also the impact on those other facilities taking on the additional workload, as these areas would need to extend business hours and ensure only critical functions were the focus.

This analysis was performed for all areas impacted by the blackout and for those that had the potential of receiving diverted phone calls, e-mails, and other core business functions that would be above their normal level of operational activity. This was performed in conjunction with technology team employees located at the other sites, as they would need to initiate many of the redirection activities because those located at the impacted sites no longer had the ability to do so.

Once the impacts were determined and the appropriate response implemented, an assessment was performed as to the impacts upon external sources. This means that they needed to discover if there was any impact to their clients and partners because the corporation was not available, as many partners had specific timelines—and deadlines—for electronic files to be submitted. In many instances, a missed deadline resulted in a financial penalty, as the corporation's unavailability impacted millions of Canadians, most notably throughout the financial systems of the country.

Along with facilities, the team looked at the power supply for the impacted sites and found that they could keep core critical operations running, but for a limited time only, as diesel generators can operate only so long. Their operability lasted long enough to ensure data and systems were not corrupted and that redirection of operations could be performed in the other facilities.

Next, the CMT looked at the impacts the blackout was having on core operations that were "in progress" at the time of the outage. Fortunately, there was enough power available through backup systems (generators, batteries) to ensure key files were disseminated to financial institutions and legal bodies without missing any deadlines, which were fast approaching. All nonessential services and equipment were powered down and taken off the power source so that these functions could be performed. Employees were asked to turn off their computers and laptops to not drain any emergency power so that these functions could be performed.

Continuous Communication

The reoccurring meetings, which started at every hour and then moved to every two hours, ensured that the corporation focused on the core areas that it knew would be impacted: the corporation, vendors and partners, clients and customers, employees, its facilities, and any service level agreements (SLAs).

but the long-term impacts of those decisions are not considered. However, the impact analysis does look at the long-term impacts of the crisis or disaster and at the impacts of decisions made at the time of the disaster. An impact analysis must determine the long-term impacts and whether decisions must be changed and/or amended based on the changing circumstances of the situation.

Temporary decisions may have had benefits based on an analysis performed at the outset of the disaster/crisis, but once the immediate crisis has passed, then it is time for a different analysis to see if impacts have changed—or not been realized as expected—and which activities must be amended based on the new impact. The impact analysis helps manage the immediate and ongoing responses required by the crisis or disaster situation.

It will determine the path and actions to take. It may require a "wait and see" period, but there still needs to be a plan in case the impact increases or changes. The impact must be monitored because it may change, and if it does, the team must be ready with the appropriate action strategy to implement immediately.

During an impact analysis (immediately upon finding a crisis), it is necessary to know what the worst case scenario could be, based on known information; this will help determine which strategies to implement or warnings to provide so that the appropriate teams are ready. The team cannot wait to find out what will happen and then try to determine the proper crisis response; time is ticking, being lost because it has taken too long from the initial impact analysis. These strategies are aligned and provided to the crisis team so that they are aware of what can/cannot be implemented based on the impact analysis of the situation—what is known and what is not known.

The impact analysis should be performed more than once during a crisis because as more information becomes known, the more some items may apply or may not apply. It depends on how the situation develops.

The impact analysis must look at internal and external impacts, as they could be very different. They may even be staggered in their impact. What starts as an internal problem may go on too long and could suddenly start impacting external partners. It may not have immediate impact, but if left unchecked or unresolved, it escalates and the impact begins to grow, compounding the issues at hand.

Based on the impacts and severity levels of those impacts—during real disasters or planning for potential ones—draft messages can be developed so that they can be disseminated to the appropriate audiences at the appropriate times. Pre-developing communications can be directly related to the impact levels of a crisis, which are determined ahead of time.

An impact analysis can help proactively identify crisis management actions and preventive—as well as response—mechanisms in the event of a disaster. Of course, it goes without saying that these communications, strategies, and contingencies are practiced—or tested—prior to anything occurring. It can also help decide where to focus resources and what needs to be available, when it needs to be available, and to whom. The derailment of a train requires the focus to be on initially ensuring that lives are saved and protected, and thus an assessment or analysis of the impact must be performed to know where to direct the correct resources, evacuation procedures, and/or containment processes. The impact of the situation must be assessed so that the right responses and actions can be implemented. Each disaster/crisis has its own characteristics, and an impact analysis of the situation helps determine the correct course of action to take to ensure the situation is contained and managed effectively.

The bottom line is also a critical element to be addressed by an impact analysis. How much can be paid for a disaster response? Is it possible to be down for a few days with minimal impact, or does the business need to be up and running in under 24 hours?

Long-term impacts that may occur can also be identified during the process so that corporations and communities can address them proactively. The CMT can find out if any impact to customers (long term) needs to be addressed. Will changes need to be made or new initiatives need to be implemented based on the ever-changing ebb and flow of a disaster or crisis situation? Sometimes a crisis can be more severe than originally thought, and thus a constant impact review must be monitored so that response mechanisms can adjust to meet new needs as the situation unfurls.

An impact analysis must aid the CMT in knowing which resources need to be maneuvered to ensure that the right focus is given where it is most needed: power resumption, shelter, or transport requirements, to name a few.

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See Aso: Contingency Planning; Contingent Coordination; Incident Management; Recovery Time Objectives; Response.

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Improvised Explosive Devices

An improvised explosive device (IED) is a bomb manufactured in an unconventional way that incorporates destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and is designed to destroy or incapacitate people, buildings, and vehicles, including aircraft and ships. Although such devices are much older, the term is believed to have originated in Northern Ireland, when it was used by the British Army after the Provisional Irish Republican Army (PIRA) manufactured and used bombs made from fertilizer and semtex smuggled from Libya.

An IED has five main components: an initiator, a switch, a power source, a main charge, and a container. Additional material such as nails or metal fragments can be included in the main charge or secured around the outside in order to increase its destructive ability. The main difference between an IED and a conventional explosive armament is that the former can appear to be any kind of object. IEDs have taken the form of luggage, cans of cooking oil, television sets, packages of various types, books, and letters. They have been sent through the mail, transported in vehicles—these are then known as vehicle-borne improvised explosive devices (VBIEDs)—or pedal cycles, or worn in vests or belts on the person. VBIEDs, including those carried by boats, can contain a huge amount of explosive material. The method of delivery list is endless.

IEDs planted by roads, commonly referred to as roadside bombs, are typically placed in drains or culverts or are buried close to the edge of the road and exploded by remote control as a target draws level. In such cases, the target forces often cease moving by road in favor of moving by helicopter.

Many commonly available materials can be used to manufacture IEDs. Powerful explosives can be made from precursor chemicals found in common consumer goods that are readily available commercially. For instance, ammonium nitrate, normally used in fertilizers, can be mixed with such items as fuel oil, icing sugar, nitrobenzene, and sugar. IEDs can be triggered using, among other things, a command wire, radio, and cell phone and a variety of timing devices, whereby the device is set to go off at a specific time. Advances in the miniaturization of electronics and the ready availability of cheap triggering devices such as cellular telephones, pagers, oven timers, video timers, and the like have enhanced the means of activation considerably.

IEDs were used by the Viet Cong against South Vietnamese and U.S. forces during the Vietnam War. In both the Iraq and Afghanistan conflicts, IEDs have been used extensively against coalition forces, government forces, and civilian targets. In Afghanistan, IEDs were also used against Soviet troops following the invasion in 1979. In Chechnya, Russian forces have again been the target of IEDs since 1994. Between 1982 and 2000,

An Afghan National Army soldier participates in a simulated counter–improvised explosive device operation with U.S. Air Force explosive ordnance disposal technicians on March 13, 2012, at Kandahar Airfield, Afghanistan.

Hezbollah regularly used IEDs to attack Israeli forces in Lebanon.

There are a number of examples of incidents where IEDs have been used in countries not associated with such conflict. In the United States, for instance, a truck containing an IED was driven into an underground parking garage at the World Trade Center in April 1993; the IED was subsequently estimated to be a urea-nitrate-hydrogen gas enhanced device weighing 606 kilograms. The occupants of the vehicle lit the 20-foot fuse and fled, leaving it to explode, killing six and injuring over 1,000 people when it exploded. Two years later, Timothy McVeigh drove another VBIED, manufactured from 2,300 kilograms of ammonium nitrate and nitromethane, and parked it outside the Alfred P. Murrah Federal Building in Oklahoma City. The IED exploded, destroying much of the building and killing 169 people. A year later, Eric Rudolph left a backpack containing "pipe bombs" in the Centennial Olympic Park in Atlanta where the 1996 Olympic Games were being held. The resultant explosion killed two people and injured a number of others. In May 2010, a terrorist attack was foiled in Times Square when two street vendors noticed smoke coming from a car that had recently been parked. Inside the vehicle were four IEDs, making up one large IED, consisting of gasoline, a quantity of firecrackers, gunpowder, propane, and urea-based fertilizer. This was all connected by wires to two alarm clocks, which were to act as the triggering device. Fortunately, the device's ignition failed to set it off.

In some cases, the IED may be set off unknowingly by the victim, such as the device that killed Member of Parliament Airey Neave in the underground car park of the House of Commons. In this case, the IED had a tilt switch, which operated as he drove up the slope from the underground garage to reach the street in March 1979. Responsibility was claimed by the Irish National Liberation Army.

The IED that was aimed at the UK prime minister and her cabinet while they stayed at the Grand Hotel in Brighton in 1984 had a long-delay timer made from video recorder components, allowing Patrick McVeigh to hide it at the hotel some two weeks earlier. The IED that brought down Pan Am Flight 105 over Lockerbie in Scotland in December 1988, killing all 259 people on board and 11 people on the ground, consisted of a small amount of semtex in a Toshiba radio cassette player. It was timed to explode over the Atlantic Ocean, but the flight was late leaving Heathrow.

The four IEDs set off by "home-grown" terrorists in July 2005 on the London transport system consisted of homemade organic-peroxide devices packed into rucksacks. Although in this case they were probably given advice by someone, no great expertise was necessary to assemble the devices, most of which could have been obtained from open sources.

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See Also: Biological Weapons; Chemical Weapons; Civil War; Failed States; Suicide Bombings; Terrorism.

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Improvising

The ability to act creatively and successfully under time pressure is a hallmark of the skilled emergency manager. Much anecdotal and scientific evidence suggests that this ability follows from exposure to a wide range of field conditions, as well as considerable experience in understanding the potential and limits of emergency response plans. The term *improvising* is used to refer to the process of real-time, creative action as practiced by individuals, groups, or organizations. Improvisation can also be associated with significant difficulties in some cases, including decreased situational awareness, group conflict about priorities, and diminished performance.

Improvisation in the Field

Research into the 9/11 attacks in New York City revealed many such instances of improvisation, both during response (e.g., the waterborne evacuation of lower Manhattan, the creation of a new Emergency Operations Center) and recovery (e.g., the rewiring of lower Manhattan, the cleanup of Ground Zero). A reasonable first step is to understand when and how improvisation happens successfully in order to generate programs for training in improvisation, and potentially to guide the systematic selection of emergency managers based on personality and cognitive traits that predispose rapid recombination of assets and personnel to fit the task environment. An appropriate next step is to use this understanding to guide the development of technologies that enable—and properly constrain—creative problem solving in all phases of emergency management.

Preparedness and Decision Making

Preparedness in emergency management means organizing for emergency response before the event occurs. The need for plan revision can arise from numerous circumstances. An emergency may evolve to the point where implemented plans are no longer applicable. An emergency may be multifaceted, requiring emergency response organizations (EROs) to combine many plans in unexpected ways. In a response involving numerous organizations, allocation of resources to certain tasks may make those resources unavailable for other tasks. Finally, resolution of unanticipated contingencies may not be immediately assignable to any particular organization. In these circumstances, EROs must be prepared to improvise—that is, to rework their knowledge in a novel way to fit the requirements of the current situation.

Typical activities during the management of emergencies are monitoring operations during normal conditions, selecting an appropriate procedure when planned-for contingencies arise, and revisiting the appropriateness of these procedures as other potentially disruptive events occur. With the onset of an unplanned-for contingency—an event for which no planned-for procedure exists—the responding organization must develop and deploy new procedures in real time.

When faced with an unplanned-for contingency, response procedures are intended either to resolve the emergency itself or to allow the managing organization to return to following planned-for procedures. Decision making in this situation can be regarded as a two-stage process. In the first stage, the responding organization recognizes either that no planned-for procedure applies to the current situation or that an appropriate, planned-for procedure cannot be executed. Once the need to depart from the plan has been recognized, the second stage is the real-time development and deployment of new procedures. The action may range from substitution (e.g., using a school bus to transport injured persons) to the construction of new procedures (e.g., using fire trucks to provide mobile showers following a chemical exposure). In addition to actions, roles of response personnel may also be improvised.

Improvised decision making entails reworking knowledge to produce a novel action in time to meet the requirements of the given situation. Improvisation is therefore creative action in context, where the context is provided by the need to meet goals, such as mitigating economic or human losses while satisfying time constraints. Indeed, there is considerable evidence to suggest that teams in decision settings like emergency management enact strategies based on recognizing characteristics of past problems in the current one. To understand improvisation, it is therefore necessary to understand how decision makers "make do" with their existing knowledge when faced with unplanned-for contingencies.

Training

The question of when to improvise may be conceptualized as a categorization or choice problem, in which the ability or likelihood of a decision maker to categorize correctly is influenced by a number of factors, such as penalties associated with making an incorrect choice and the likelihood that the response will succeed. Increased time pressure and risk may also influence how the choice is made, in part by reducing the inclination to improvise when the choice arises. The correct choices in this problem (improvising when no planned-for procedure applies or can be executed; not improvising when a planned-for procedure does apply and can be executed) have been fairly well investigated. There are also numerous studies of one incorrect choice (failing to improvise when an appropriate, planned-for procedure either cannot be found or cannot be executed). The second incorrect choice (improvising when a planned-for procedure applies and is executable) is certainly underinvestigated.

The activity of improvisation is understood to begin with a search for resources that may be recombined to fit the requirements of the problem. The utility of this novel solution is typically uncertain, the solution must be modified as it is applied, and planning and task execution begin to occur almost simultaneously.

The question of how to improvise may be conceptualized as a search and assembly problem, which may be influenced by factors such as time available for planning, risk in the environment, and the results of prior decisions. Knowledge of planned-for routines and the situations for which they are appropriate can contribute to this ability, provided that response personnel can recognize when it is appropriate to depart from plans. Exposure to a wide variety of situations may also contribute to the capability to improvise.

The question of the level of improvisation can be described along a degree dimension, ranging from simple reinterpretations to completely novel solutions. There is also a second contextual continuum reflecting the difference between procedural versus command or management improvisation, anchored at one end by first responders adjusting and recombining specific tools, skills, leaders, or organizations and rapidly realigning large numbers of assets and personnel. Qualitative studies of complex, ad-hoc, and civilian-controlled organizations and large military organizations with similar characteristics suggest that command improvisation is typified by a flattening of hierarchy, sudden shifts in roles and authority, concentrating resources and expert knowledge to support authority shifts, and altering communication flow.

Four overall training needs that pertain to improving skill in improvising may thus be identified: (1) recognizing when it is appropriate to depart from planned-for procedures, (2) learning how to develop and deploy new procedures in a serial fashion under time constraint, (3) communicating across multiple decision makers, and (4) making inferences about the present and likely future states of complex systems such as physical/public infrastructure and making judgments about and compensating for the risks associated with improvisational action.

Documenting and Evaluating Improvisation

Once the organizational context has been established, the next stage is to identify, describe, and classify cases of emergency response decision making. The identification and selection of cases for study is likely to arise from the particular needs of the study. Data sources that may be of use for this stage include communications logs, videotapes, questionnaires, interviews, news reports, after-action reports, testimony, and emergency response plans and procedures. Classification is accomplished by applying content analysis based on keywords of the decisions made in the cases. Because disasters induce greater narrowness and selectivity in human perceptions in comparison to routine situations, corroborating sources may be sought in an attempt to find multiple perspectives on the same events.

Role of Technology

At present, the importance and relevance of improvisation in emergency management is not well reflected in the design of accompanying information technologies. In training, information technology-based systems (e.g., Internet-based examinations for National Incident Management System training) have a proven effectiveness at inculcating skills and drills, allowing personnel and trainers to reflect on the rationale behind correct and incorrect performance. During response, information systems such as geographic information systems for consequence management can be useful for supporting shared situation awareness. During recovery, other systems, for example document management systems for tracking contracts, can support organizations in cataloguing lessons learned from the response. But a persistent problem with these and other information technologies is that many cannot adapt themselves: instead, they must be reprogrammed to meet emergent needs. As a result, sophisticated or highly specialized technologies may be dropped

Case Study: Improvisation to Restore Electrical Power During 9/11

This case study concerns the loss of electric power to a telecommunications facility in New York City following the 2001 attack on the World Trade Center.

The standard operating procedure for restoring power could not be executed for a number of reasons, some involving emergent interdependencies with other critical infrastructure systems. According to a senior networks operations manager from the company that ran the center, "The reason [the standard operating procedure] didn't work here was that there were water main breaks at the same time. So, [because] the generators are in the basement of our building, they got flooded." Water had also entered the basement as a result of firefighting activities. A second contingency had arisen when debris from the collapse of World Trade Center 7 clogged the air intakes of one of the generators in the telecommunications building. As a result, by about 5:30 P.M. there was "no commercial power and no generators operating, but equipment still operating normally on batteries." The batteries became depleted approximately five hours later, after which time none of the building's telecommunications systems were operative.

The need for power was immediately obvious and of primary importance. A decision was made to connect diesel fuel-powered portable generators to the electrical system of the telecommunications facility. Other options were not considered. In fact, the decision to use diesel generators was made in a "split second," according to the manager. Concurrent goals were to clean the environment and equipment.

The standard procedure for connecting a generator to the building would likely have been to connect via the basement hookups and thus power the building. The hookups and switches located in the basement were clearly labeled with the names of the floors to which they pertained. However, the water and debris in the basement made this procedure unexecutable. A decision was then made to connect cable from the diesel generators directly to the floors they were to power, but "there's no good way of doing that, because it's all hard wired in an elaborate system of switches," the manager noted. This decision was "one of those decisions that truly took milliseconds. I said, OK we have to get the building risers—meaning the hard-wired cables—cut them and splice cables from the street into the riser." The risers are cables within the building that are normally used to transmit power throughout the building. This solution required cutting those cables and attaching them to portable generators that had between 1- and 2.5-megawatt capacity. The requirement was to "solve the problem as if there was no basement in the building, where all the equipment was located."

because they were not built to solve the current problem, and would require too much time and effort to reconfigure. On the other hand, ill-fitting technologies may continue to be used even when it would be best to discard them. It is therefore appropriate to consider what information technologies can provide the best fit to the task at hand, given the tremendous uncertainty that can accompany disasters.

Conclusion

Emergency response organizations are faced with complex, unprecedented events with the potential for catastrophic losses. Prior research on behavioral aspects of improvisation in emergency management and other domains has led to improved understanding of its extent during response operations and how its incidence and effectiveness may be influenced by a variety of factors. Yet if improvisation is to be planned for, it is vital to clarify the understanding of underlying processes.

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See Also: Multiple Disaster Problem; Operational Plans; Pre-Crisis Training and Planning; Preparedness; Terrorism.

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Incident Action Plans

It is already known that emergency management describes the science of managing complex systems and multidisciplinary personnel to address extreme events, recurrent disasters and crises across all hazards, and through the phases of mitigation, preparedness, response, and recovery. We have been exposed to certain terms like incident command, first responders, hazard analysis, and mobilizing emergency response. One key aspect of the entire emergency system is the incident action plan, or IAP.

An IAP is a fairly detailed and extensive document. Emergency management describes the science of managing complex systems and multidisciplinary personnel to address extreme events, across all hazards, and through the phases of mitigation, preparedness, response, and recovery by the fire chief, senior emergency expert, or emergency manager based on certain requirements, threat issues, and operational principles that enable emergency response operations to run as smoothly as possible. The IAP is tailored to the specific incident, as it is immediately understood and is subsequently modified as needed afterward based on new information arising from the crisis scene itself.

For example, a bus crash on an interstate highway where the bus left the roadway and careened down an embankment killing seven and injuring

35 people provides a fairly straightforward emergency situation calling for an IAP tailored to that situation. By contrast, if the vehicle is changed to a tanker truck carrying anhydrous ammonia that leaves the highway and ends up embedded in the wall of an elementary school, a variety of immediate, developing, and emerging issues must be factored into the IAP. This is done so all threat issues and risks related to the truck crash, the driver, injured pedestrians or passers-by, release of toxic fumes, the safety of the school, the possible evacuation of the crash scene and neighborhood, and other related issues have been comprehensively addressed.

When the IAP is developed by the senior emergency management expert on scene, one of the first issues is to determine which aspects of that specific crisis or emergency are linked to either “hazard-generated actions” versus “crisis-driven actions” based on the kind of appropriate response needed. Both of these elements often operate at once, with the hazard-generated actions being those that reflect the need for the following:

- Public warning
- Search and rescue
- Care of injured or dead
- Restoration of essential services
- Actions to reduce continuing threat

In contrast, the crisis-driven actions often refer to different activities, such as the following:

- Emergency communications
- Continuous assessment of the emergency situation
- Coordination of mobilized emergency assets
- Effective application and utilization of resources and technology
- Assessment of triage needs, relocation, and evacuation risks

Based on guidance issued by the Department of Homeland Security, many aspects of the IAP system are included in the National Incident Management System (NIMS). This document reflects traditional operational practices of urban fire chiefs, experts, and emergency managers and contains newly designed techniques aimed to codify and sharpen the procedures senior emergency officials will rely on in managing an emergency incident so that a common operational framework exists.

Most IAPs contain fundamental elements common to all that capture the basic ingredients of a fluid and dynamic plan that must fit every conceivable emergency situation, from ordinary disasters to major complex terrorist events. The flexibility of the IAP structure allows it to expand and contract depending on the simplicity or complexity of the emergency situation. Looking at the normal structure and flow of ordinary IAPs, there are certain basic elements, as follows:

- Designation of incident commander and deputy
- Designation of incident command staff and experts
- Assessment of the emergency situation
- Determination of overall strategy, priorities, and options (expected SOP or unexpected?)
- Outline key objectives and tasks to reduce or eliminate the emergency
- Assign key people to perform and complete these tasks
- Assign appropriate resources and technology to task completion
- Determination of operational periods and tasks to be completed for each period
- Issuance of initial emergency situation report
- Command communications (site maps, weather, proximate hazards)
- Special protective equipment required by responders
- Establishing safe perimeters/restricted access to emergency site
- Update IAP at least every 10–12 hours or when threat situation changes

IAPs are sensitive to the demands placed on the response system; the issues addressed first are usually demands created by the hazard itself, followed by the need to develop an appropriate response strategy and set of objectives, which is normally done by the incident commander during response planning. When well-known hazards and emergency events can be reduced to standard operating procedures (SOPs) by senior experts, the relative ease of response to future emergencies of that type is dictated by the similarity between the actual crisis and the SOP developed to deal with it. The IAP also contains general tactics to achieve goals and objectives within the overall response strategy devised, while providing important information on event and response parameters, resource management issues, and time-phased response operations. Equally important, the IAP facilitates dissemination of critical information about the status of response assets themselves. Because incident parameters evolve, action plans must be revised on a regular basis (at least once per operational period) to maintain consistent, up-to-date guidance across the system.

Emergency situations can be divided into at least two general realms of operational demand: the situation is either under control or it is not. Incident priorities shift from life safety to property conservation very quickly, and many actions based on well-known SOPs may mitigate a vast majority of the emergency incidents requiring a response. Actions based on prediction, preparation, and development of standard operating procedures make response an easier job. When initial actions fail to control the incident, continuing actions are required, and a plan must be developed and implemented.

Continuing actions by senior emergency officials or the incident commander may address the remaining life-safety priorities or allow emergency responders to concentrate on reaching the point of stabilization. This phase of emergency response means the “out of control” situation has shifted to a much more controllable situation. Even then, however, a strategy must be developed and tactical objectives must be determined and assigned to bring the emergency to a point of controlled termination. In all cases, and in all phases, coordinated actions and accountability of personnel are key elements of the IAP. Once a situation is stabilized, a dramatic shift occurs. The “out of control” situation is now “under control,” and time, once against us, is now fully on our side. As a consequence, incident command switches from reactive to proactive actions.

This can be better understood in terms of the phases of an ordinary emergency, as follows:

- Phase I : Assessment of the emergency
- Phase II: Actions taken to stabilize or control the emergency
- Phase III: Actions taken to prevent further damage or harm to public safety
- Phase IV: Actions taken to finalize the crisis and terminate the emergency
- Phase V: Actions taken to restore order, redeploy equipment, resume preparedness

Finally, once the phase of controlled termination (Phase IV) occurs, the incident commander reallocates staff and resources and focuses on residual damage and cleanup, including anything from site decontamination to simply departing the scene in such a way that no safety or security issues remain at the emergency operations site that pose a threat to the public. Termination actions involve placing emergency equipment back into service and getting ready for the next incident, but they also involve leaving the scene in the safest state possible for the occupant/owner, law enforcement personnel, or fire investigators.

Establishing a priority for every incident is the bedrock foundation for a successful IAP, and although many of these may vary depending upon the specific hazard or emergency, the National Fire Academy identifies three incident priorities:

1. Life safety
2. Incident stabilization
3. Property conservation

What does life safety exactly mean? It involves first responders, other emergency workers on scene, and the general public. However, an IAP must also consider developing a zone of safety between the immediate emergency and its resolution. This is particularly difficult in a complex search-and-rescue situation where searchers enter a situation in mid-crisis while ongoing efforts by firefighters and others to control the crisis are under way at the same site. This is both a safety and an incident management situation that requires that an IAP deal with rapidly changing circumstances. Similarly, knowing when an emergency situation has in fact been stabilized is yet another key issue for an IAP, because clear and unambiguous indicators of diminished or nullified risk are hard to find in complex emergency situations. This is one reason why outside subject matter experts (SMEs) are often needed.

One aspect of incident command specified in the IAP that may not be well understood is the risk-benefit analysis that the incident safety officer (often the incident commander [IC]) must perform and regularly update in each operational period that normally extends for 12 hours at a time. Of course, safety is everyone's job, especially the first responders, who should keep risks at a reasonable level. The incident commander must conduct a risk-benefit analysis for the entire incident and monitor changes as the crisis moves from "out of control" to the "under control" phase.

The incident action plan is based on the sum of all resources immediately available and those expected to continue responding. The goals and tasks established are devised in accordance with the incident priorities from which a strategy must emerge; tactical objectives, aimed at meeting the strategy, are then determined and specific assignments made (if not already addressed in the SOPs). An accountability system should be established as assignments are made. This is generally the basic formula for all IAPs. From a resource consumption standpoint, consideration must always be given to standby reserves and backfill positions in an IAP, along with supplemental resources, to ensure no interruption in continuous, high-quality emergency response.

Specific steps associated with incident coordination and communication must also be spelled out in an IAP to the extent possible. In some cases of unforeseen events, experienced incident commanders have built in a contingency to ensure there is no lapse in the intensity and coverage of emergency response even if a substantial surprise or setback may occur. Humans have the capacity to be creative under duress and in very stressful situations, but IAP direction and uniformity of purpose are key. Some first responders will be tempted to "freelance" in the absence of a specific assignment; however, the IAP should consider and anticipate this to the extent feasible.

At Phase V in the overall IAP process, there is still a need for a new detailed size-up and risk-benefit analysis. Information previously received should be reevaluated, and new information should be gathered and considered in detail. Whether it is a destroyed building, a downed airplane, or a HAZMAT scene scattered over a few acres, complete surveys for structural damage, environmental damage, and economic and social destruction should be made. Termination efforts during this phase should be directed at leaving the emergency site in the safest condition possible. Again, a dedicated size-up and risk-benefit analysis should be conducted. When checking for hot spots, crews should monitor the air for elevated carbon monoxide levels. Also, the building's structure should be assessed and, if necessary, building officials should be properly notified of any hazards that may exist. Obvious hazards should be eliminated and potential hazards identified.

Writing the objectives and tasks for an IAP is generally derived from actual experience in witnessing how specific incidents are managed, and the general rule is that the goals and tasks should be specific, measurable, achievable, realistic, and calibrated to a timeliness requirement if possible. The quality of response is often much more significant than the quantity of response, although IAPs seldom reflect this distinction.

Finally, the IAP is an integral part of the NIMS framework and must be understood as a critical component of it. So it is equally important to understand how an IAP supports the everyday management of a crisis and undergirds the NIMS in every way. The Incident Command System (ICS), as described in NIMS, refers to the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure and designed to aid in the management of resources during incident response. The ICS is based on eight concepts that contribute to the successful application of this system:

1. *Common terminology:* Use of similar terms and definitions for resource descriptions, organizational functions, and incident facilities across disciplines.
2. *Integrated communications:* Ability to send and receive information within an organization, as well as externally to other disciplines.
3. *Modular organization:* Response resources are organized according to their responsibilities. Assets within each functional unit may be expanded or contracted based on the requirements of the event.

4. *Unified command structure:* Multiple disciplines work through their designated managers to establish common objectives and strategies to prevent conflict or duplication of effort.
5. *Manageable span of control:* Response organization is structured so that each supervisory level oversees an appropriate number of assets (varies based on size and complexity of the event) so it can maintain effective supervision.
6. *Consolidated action plans:* A single, formal documentation of incident goals, objectives, and strategies defined by unified incident command.
7. *Comprehensive resource management:* Systems in place to describe, maintain, identify, request, and track resources.
8. *Predesignated incident facilities:* Assignment of locations where expected critical incident-related functions will occur.

For ICS to be effective, the incident must be formally defined so that there is clarity and consistency as to what is being managed. This may be best accomplished by defining the incident response through delineation of enumerated response goals and objectives, and by explaining response parameters through an incident action plan (IAP)—the primary documentation that is produced as a result of the incident action planning process. With a well-developed ICS and emergency management support, the incident response proactively addresses both types of demands and, in fact, reduces many response-generated demands to often a more routine status.

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See Also: Impact, Definition of; Impact Analysis; Incident Management; Incident Response; National Incident Management System (NIMS); Response; Risk Assessment.

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Incident Management

Large-scale crisis events such as the 9/11 terrorist attacks, Hurricane Katrina, the Japanese tsunami, and the swine flu outbreak illustrate crises whose scale, distribution, complexity, and duration require unique management capabilities. Incident management provides this capability.

Incident management capability starts with anticipating and planning for the unexpected. Although it is impossible to predict all eventualities, planning and anticipation increase the range of circumstances incident managers can respond to promptly and effectively. A second issue is recognizing and acknowledging that large-scale crises present demands that fall well outside normal response capacities. This introduces a need to plan in ways that afford opportunities to consider how best to use limited resources over potentially prolonged periods of time and the need for flexibility and adaptation. For example, volcanic and pandemic crises can persist for months and even longer and result in having to manage escalating impacts with dwindling resources. Frequently, the initial emergency impact cascades into secondary impacts, such as loss of critical infrastructure. Meeting these unique demands calls for incident management to occur at three interdependent levels: strategic, tactical, and operational.

Strategic Incident Management

Strategic incident management is responsible for developing requisite policy, plans, and capabilities. This includes developing integrated disaster management capability, how this capability will be activated and used, and the procedures and practices required for effective functioning.

During a crisis event, strategic responsibilities encompass securing and coordinating resource access and deployment to sustain response over the longer term, managing on-flow impacts on community and societal functioning (e.g., economic impacts), and activating recovery planning. The time frame for such activities is approximately 1–7 days (for resource procurement) to months (for recovery planning). Crisis events present several unique challenges to the strategic planning process. These are illustrated with reference to organizational learning, multiagency response, and staffing.

Organizational learning: The infrequent nature of large-scale crises means that strategic incident managers have limited, if any, experience of the kinds of events they may have to manage. To enhance their adaptive capacity, strategic incident managers develop their understanding by learning from past crisis events, learn to think "outside the box" in order to anticipate the scale and implications of crisis events, and develop their risk management culture accordingly. The outcomes of these deliberations are encapsulated in the policies and the management procedures, practices, and attitudes required to facilitate managing future crises and for considering the implications of multiagency and staffing issues.

Multiagency response: Strategic incident planning requires the involvement of key stakeholders (e.g., emergency management, public health, law enforcement, health and mental health care, jurisdictional legal authorities). This ensures that, as far as possible, all stakeholder groups likely to have roles and responsibilities are identified and included in the planning process. Planning should also consider staffing issues.

Corey Gruber (center), assistant administrator for FEMA's National Preparedness Directorate, observes students working on a "survivor" prior to a simulated decontamination. Rick Dickson (left), assistant director of CDP Training and Education, explains how, through this process, first responders understand how their responsibility affects another responder's role. Strategic incident managers develop their risk management culture by studying past crises in order to anticipate the magnitude and implications of future crisis events.

Case Study: The 1995 and 1996 Ruapehu Volcano Eruptions

The 1995 and 1996 eruptions at Ruapehu volcano created unprecedented activity at a New Zealand volcano. Incident management challenges arose from multijurisdictional management, the need for multiple incident management centers, and the large number of response organizations and agencies involved. In addition, the duration and tempo of the event created some problems. For example, there was a need to manage the implications of the dynamic interaction between volcanic (such as changes in levels of ashfall) and meteorological (including wind strength and direction and rainfall) processes (such as wind creating impacts several hundred miles from the volcano and changes in wind direction that resulted in different communities being affected at different times).

The scale of the event resulted in strategic management being handled at a national level and involved collaboration with agencies such as the Civil Aircraft Authority, the Meteorological Service, and a scientific advisory group that provided input on vulcanological processes that had not been planned for. The distribution and changing patterns of impacts resulted in the activation of tactical incident management groups at regional levels. Reviews identified several issues that adversely affected incident management.

Most Significant Issues

The most significant issues were a lack of clear responsibility for coordination between strategic and tactical levels and inadequate coordination of response at the tactical level. With regard to the former, coordination difficulties were attributed to tactical groups assuming a level of direction from the strategic level that was inconsistent with strategic capabilities as they grappled with problems anticipating the nature of evolving events. This created issues as both levels were forced to deal with contingencies as they arose. This problem decreased as understanding and processes developed.

At a tactical level, lack of familiarity between the agency representatives involved in tactical management undermined initial coordination efforts, as relationships had to be developed in situ. Problems were compounded by interorganizational differences in operating structures, procedures, and terminology. Although incident management teams had identified agencies that could be involved, networking was poorly developed and initial planning and decision making were conducted on an ad hoc basis, with this contributing to both coordination and communication problems. Stress associated with the initial urgency of issues, problems accessing and interpreting information about dynamic processes, and operating in ad hoc groups were identified as contributing to coordination and communication issues.

Information management was also a problem. An external review found that 56 percent of incident management team members reported receiving too much information, 50 percent receiving too little information, and 56 percent finding relevant information difficult to obtain. In addition to coordination issues, this review identified problems associated with training and contingency planning. Use of existing local government structures that inhibited flexibility when responding to dynamic demands was also identified as contributing to communication and decision-making problems.

Review

A review identified a need for training and development work to cover multidisciplinary teamwork, the transitory adoption of different operating and decision systems and processes when working in incident management teams including multiagency membership, consultative (contingent) planning and creative problem solving and decision making to translate plans and adapt them in response to changing needs and circumstances, managing the transitory transfer of control to external agencies when situational demands require it, coordination and task assignment in multi-jurisdictional/organizational operating contexts, and the need for emergent management roles (e.g., media, interorganizational liaison, and administration).

Staff roles and deployment: Realistic human resource planning is essential. Staff may have to be deployed in novel ways in threatening circumstances for periods that may range from days to months. Incident management planning should anticipate contingent staff deployment specifically in relation to disaster demands and needs. Because staff and their families can be affected by the disaster, staff should be involved in planning to ensure that they understand and accept their roles and consider the implications of the event for their availability (e.g., whether they report to work if a pandemic occurs). Staff availability can be affected by infrastructure losses (e.g., earthquake) that limit staff mobility and availability, particularly during the first few crucial days. Thus, it is important that plans do not overestimate staff availability.

Planning should address the need to provide basic education on disaster preparedness, response, and support, and the availability of procedures and resources (such as risk management protocols, personal protective equipment, and antivirals) required to ensure staff safety as far as possible and facilitate their effective performance under challenging and threatening circumstances.

During crisis response, the strategic level can delegate some aspects of the short-term management to the tactical level for coordination. Feedback from the tactical level is used by the strategic level to inform resource procurement and to adapt long-term response and recovery plans.

Tactical Incident Management Teams

Tactical incident management is concerned with adapting plans and actions to balance strategic objectives with operational (i.e., real-time) realities within time frames that are measured in hours to days. Decisions at the tactical level relate to managing and mitigating the immediate and indirect effects of the emergency, even including prioritizing resource deployment to cope with limited staff and other resources to address the most pressing issues or neediest groups. This frequently involves coordination within an ad hoc group or between groups that may or may not be collocated and also to coordinate with others involved in the emergency response (e.g., community relief and recovery centers). These diverse inputs ensure more representative situational awareness and definitions of response problems (which can change rapidly as events escalate), and they facilitate the ability of incident management teams to prioritize problems and needs and plan the allocation of limited resources.

The performance of these activities is expedited by being able to use analytical and crisis (e.g., naturalistic) decision making to make effective decisions. A key competence is the ability to anticipate and manage problems under conditions of uncertainty with incomplete and ambiguous data. These demands frequently result in stress on incident management team members. The use of buddy systems and peer support can help manage stress and help sustain performance capability. Stress management and performance capability can be sustained by developing information management capability.

Multiagency incident management: An important tactical competence is being able to interpret, collate, and use diverse information to manage complex events. In complex disasters, this is done in multiagency and multi-jurisdictional contexts. For example, the information required to comprehend and manage terrorist events is developed in teams comprising government, medical, public health, biological and radiological, medical, and emergency management representatives. The management of volcanic crises can involve emergency managers, vulcanologists, public health experts, meteorologists, and structural engineers.

The capacity for interagency communication and decision making can be developed using interagency team development to better integrate respective agency roles. Joint training facilitates a capability for proactive response management by facilitating the development of shared "team mental models" that increase the capacity of diverse professionals to share understanding of evolving events, coordinate inputs, and make decisions. This increases implicit information sharing during high-workload periods, enhancing team performance and adaptive capacity for proactive response management through better tactical decision making and resource allocation. The quality of the latter process has a significant influence on the operational response.

Operational Incident Management

Operations are enacted at the front line of response. Key aspects include executing the tactical plan and providing feedback/changing circumstances to the tactical level. Operational response involves the execution of the tactical plan based on exercising professional, technical, or scientific skills, but in atypical, challenging, and threatening circumstances. Although people often apply their routine professional or technical competencies, their roles and relationships can change if circumstances require (e.g., police officers being deployed for body recovery work or assisting triage).

The complex nature of crisis response can result in operational staff having to work with and collaborate with members of other professions. For example, the response to a terrorist event could involve hazardous materials response teams, urban search-and-rescue assets, medical services, bomb squads, and private contractors.

Operational incident management personnel face the highest risk of experiencing stress and traumatic stress reactions from their direct experience of the disaster and from working in stressful roles in challenging (e.g., too few staff, nonroutine roles) and threatening (e.g., working in damaged or smoke-filled buildings, contact with infected people, contamination) circumstances. Stress can be managed in several ways, including management practices, support, and training.

Training and simulation play key roles in preparing operational staff for the unexpected. Simulations afford opportunities for individuals to review plans, develop technical and management skills, construct realistic performance expectations, practice skill use under realistic circumstances, increase awareness of stress reactions, and facilitate rehearsal of strategies to minimize stress reactions.

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See Also: Command and Control; Contingent Coordination; Crisis Information Management Systems; Decision Making Under Stress; Emergency Manager; Interoperability; Mental Models; Operational Readiness; Pre-Crisis Training and Planning; Strategic Plans.

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Incident Response

Perhaps nine out of 10 incidents are small and simple enough to require no deviation of procedures from normal modes of operation. Hence, this article concentrates on the small minority in which regular procedures are suspended and substituted with special ways of working. The term *incident* is taken here to mean an abrupt, probably unexpected, negative occurrence. Destructive landslides, structural collapses, bomb attacks, hostage taking, minor earthquakes, crowd crushes, and transportation crashes are all examples of such incidents.

When an incident occurs, it is first necessary to establish the geographical extent and severity of what has happened. This information enables a scene commander to assess whether a major incident declaration is needed. It is imperative that declarations be made in concert between the responding services to ensure that the change to emergency procedures is properly synchronized. It is also important to ensure that the "all clear" and "stand down" are announced to signal the end of the incident and its associated emergency operations.

A Model of Incident Response

A standard model, or anatomy, of incident response is shown in Figure 1. In urban environments where communications are good and

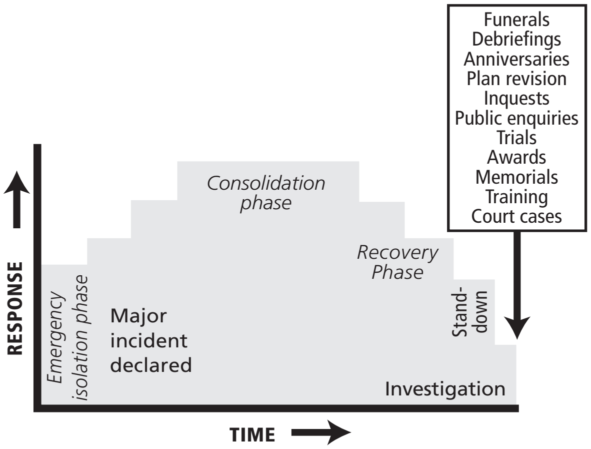

Figure 1 Anatomy of response to a major incident

response times are fast, the emergency isolation period will probably only last a few minutes before the full apparatus of emergency response is mobilized. The consolidation phase involves bringing the scene under control and limiting further damage or other adverse effects. Cordoning is positioned (see Figure 1), command is established, and victims are rescued. A mobile command post may be brought to the area and a radio link established with an emergency operations center (EOC), which will be fully activated until the incident is declared over. Medical centers may also declare a major incident, which involves calling in extra personnel, halting normal admissions and routine surgery, and preparing for triage of incoming patients to determine which priorities for treatment to adopt. Patients may even be sent home in order to clear space and free up resources for a mass-casualty influx.

The incident may end with a detailed forensic investigation, which will be conducted either to establish blame for the incident (negligence or culpability) or to identify measures that will help avoid or reduce such events in the future. Finally, the longer-term aftermath, measured in months and years, will involve societal events that assimilate the incident into the culture of modern life. There will be grieving and memorial services, possibly including a monument, and there may be a public inquiry and legal proceedings against any person or agency suspected of culpability. The experience and lessons of the incident will be incorporated into training and planning activities.

Case History: The 2005 Buncefield, England, Oil Storage Depot Explosion

At 6:02 A.M. local time on Sunday, December 11, 2005, a valve malfunction triggered a major explosion at an oil storage depot at Buncefield, adjacent to the town of Hemel Hempstead, north of London. About half of the 22 tanks of kerosene, gasoline, and diesel fuel at the site caught fire and the flames were not extinguished until 1:00 A.M. on the following Wednesday. Sixty-seven people were injured but, miraculously, no one was killed. The response required a large area to be cordoned, including part of the adjacent trunk freeway. The wreckage of 237 vehicles had to be searched for possible trapped occupants (fortunately, none were found). Three hundred fire trucks, 2 kilometers of hoses, and 12 high-volume pumps were used at the site. Once the water hoses were operationalized, vehicles could not drive over them, which required some ingenuity in the design of traffic flows. Water usage peaked at 2 million liters an hour, and the largest foam attack in European history was mounted, with 25,000 liters per minute pumped.

Blast effects had damaged local housing, which had to be made safe, boarded up, and cordoned to prevent unauthorized access, while 2,700 residents had to be evacuated immediately. Foam covered the site of operations, including open manholes, which rescuers were liable to fall into. The fire threatened to cause tanks, rendered plastic by the intense heat, to give way and release burning fuel on the rescuers. Likewise, containment bunds threatened to disintegrate in the heat, allowing fuel to wash across the site. Eventually, when the fire was extinguished and a week had been spent cooling the wreckage, some 30 million liters of contaminated water remained at the site, and the environmental cleanup was prolonged. Meanwhile, business continuity measures had to be activated for some 300 businesses located in the adjacent technology park, which was devastated by the blast. In synthesis, emergency operations were efficient and successful, but highly demanding. Because 90 percent of the county's firefighters were used at the site, mutual aid from neighboring counties proved indispensable.

An incident that happens on a discrete, circumscribed site (such as a transportation crash or bomb blast) will probably require cordoning. Failure to accomplish this would lead to an "anthill" response to the emergency, in which many of the people in the operational zone are extraneous to emergency activities. In contrast, cordons help ensure that only responders with designated tasks and adequate personal protection are allowed into the area affected by the incident. They also help protect evidence for the forensic investigation. In this respect, the rescue of victims and making safe of the site (for example, by putting out fires) take precedence over the needs of the gatherers of forensic evidence, but as a rule, rescuers should disturb the site as little as possible until the investigation is complete.

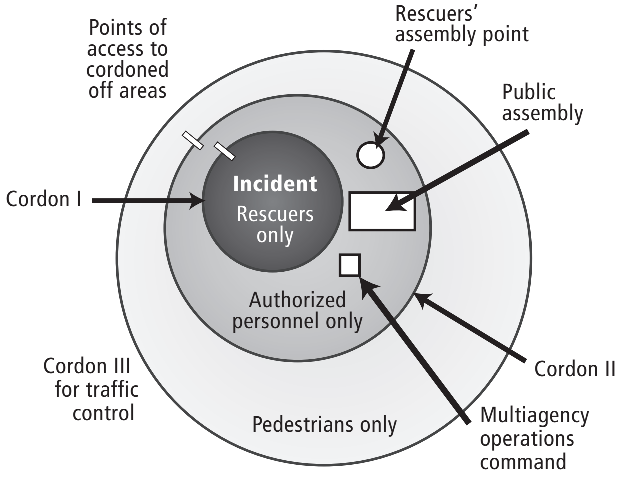
Points of access to cordoned off areas
Rescuers' assembly point
Public assembly
Cordon I
Incident
Rescuers only
Authorized personnel only
Cordon II
Cordon III for traffic control
Pedestrians only
Multiagency operations command

Figure 2 A three-cordon model of incident response

Cordons and What Is Inside Them

Figure 2 shows a three-cordon model derived from European practice. The inner cordon bounds the area that is operational but dangerous, into which only rescuers with personal protection are allowed entry. The second cordon bounds the area to which only rescue personnel and vehicles are allowed access. This ensures that assembly areas, command posts, and casualty collection points are able to operate with minimal congestion. The outer cordon excludes extraneous traffic in order to ensure rapid movements of emergency vehicles. This model is designed to help make on-site operations efficient, but at the expense of requiring

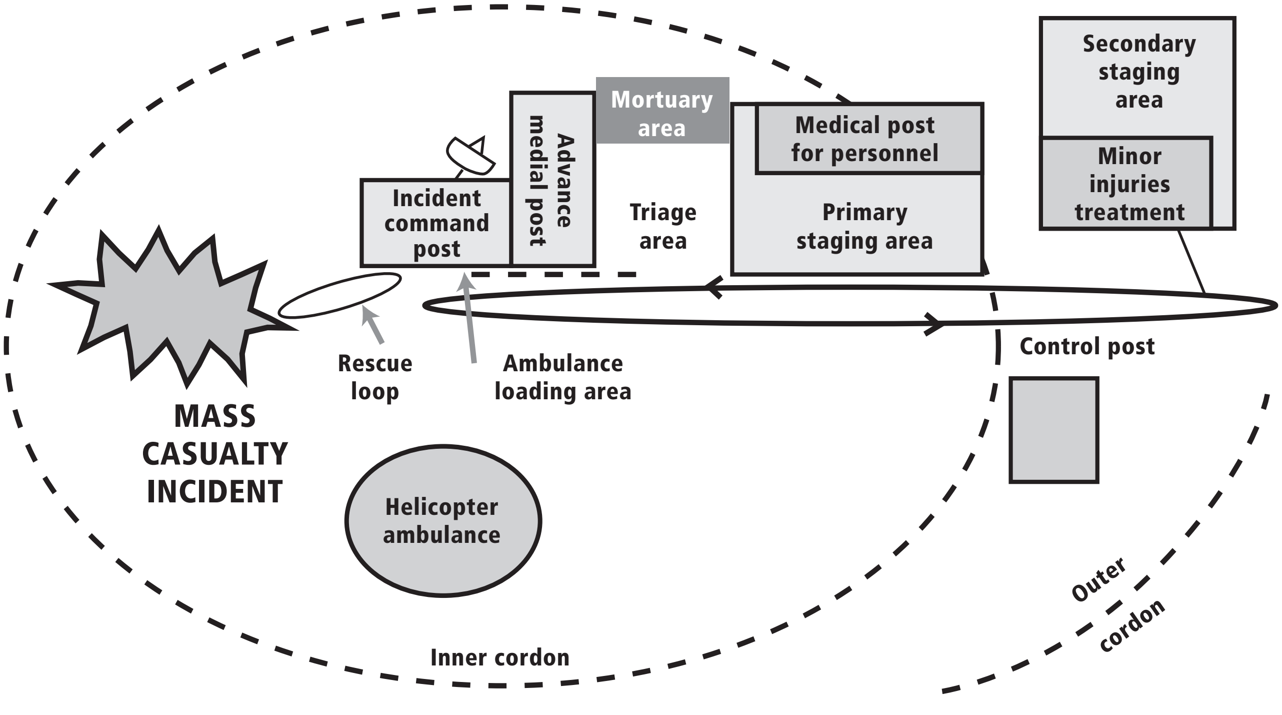
Secondary staging area
Mortuary area
Medical post for personnel
Advance medial post
Minor injuries treatment
Incident command post
Triage area
Primary staging area
Rescue loop
Ambulance loading area
Control post
MASS CASUALTY INCIDENT
Helicopter ambulance
Outer cordon
Inner cordon

Figure 3 The main elements of incident response

substantial personnel (probably from police forces) to man the cordons, especially in urban areas where there may be many access routes to the site. It may also restrict legitimate emergency operations if not all responders are authorized to pass the roadblocks. Note also that for simplicity, the model is given as circular and concentric, whereas in reality it will be irregular in form. For example, a chemical contamination incident may require the cordoned area to be extended downwind. Decontamination units may be situated adjacent to the control posts for entry to the cordoned areas.

Figure 3 simplifies the pattern of cordoning but includes more of the elements that appear in a typical incident response. The linkage between the mobile command post and a distant emergency operations center serves to relay information from the field and enables the EOC personnel to determine which resources need to be sent to the operational area. An advance medical post (also known as a first-aid post) serves to give pre-hospital care to patients whose condition needs to be stabilized. Before that can happen, a triage officer determines which patients should receive priority for initial treatment and transportation to a hospital. Patients arrive on stretchers via the rescue loop. Those (if any) who are dead or moribund are triaged as "black-coded" and placed in the mortuary area. Red-coded (urgent) patients are given primary care and sent to a hospital. Ambulances follow the loading and evacuation circuit but are activated according to "first-wave protocol." This means that primary triage must be completed before patients are loaded and transported, in order to ensure that the priority of cases is correct. Finally, "yellow" (delayed urgency) and "green" (walking wounded) patients are escorted to a

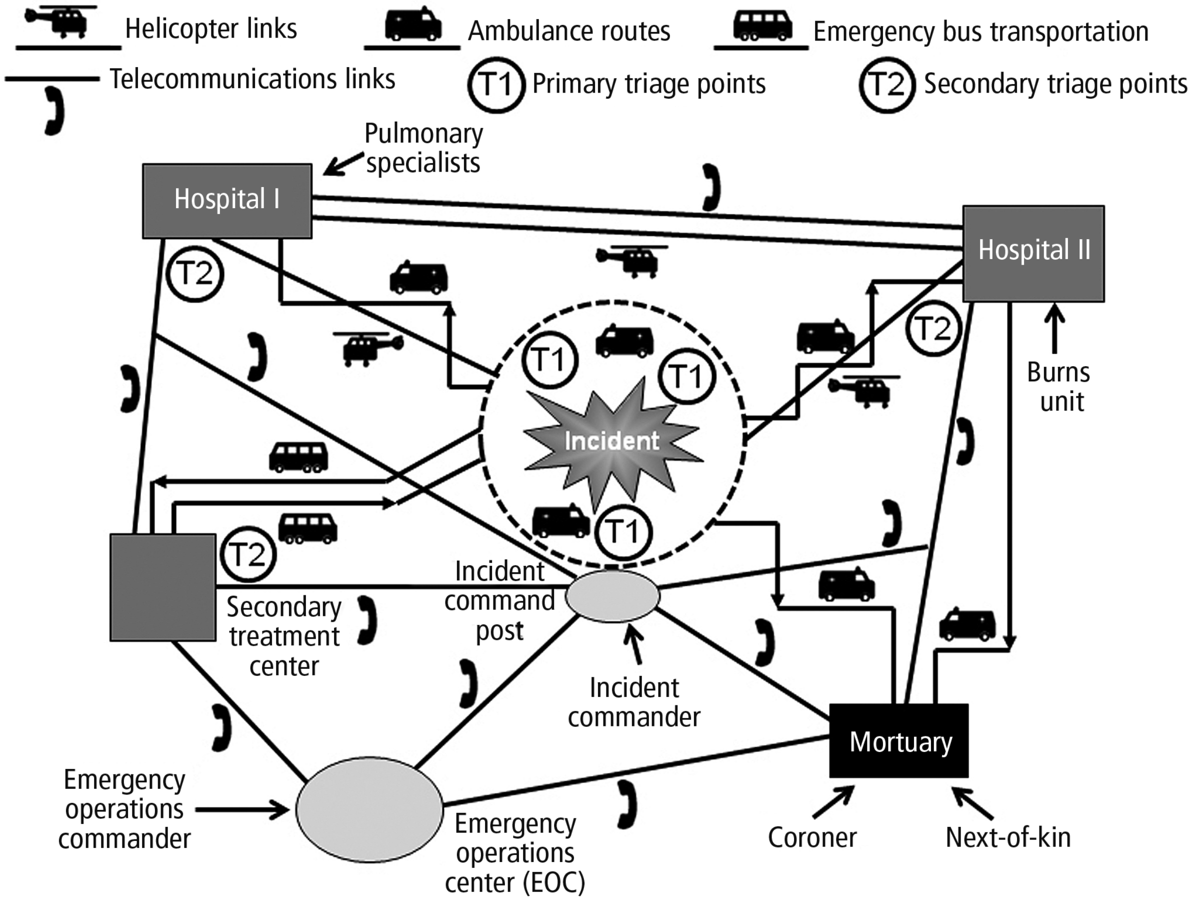
Helicopter links
Ambulance routes
Emergency bus transportation
Telecommunications links
T1 Primary triage points
T2 Secondary triage points
Pulmonary specialists
Hospital I
Hospital II
Burns unit
T1
T1
T1
T2
T2
T2
Incident
Secondary treatment center
Incident command post
Incident commander
Mortuary
Coroner
Next-of-kin
Emergency operations commander
Emergency operations center (EOC)

Figure 4 Pattern of response to a mass-casualty incident

holding area pending mass transport to a place, such as a clinic, where they can receive proper medical checks and be discharged as appropriate.

There are two other elements of the scene to describe. For medical evacuation and urgent deliveries, a helicopter landing area is required, which must be free of obstructions. This means that it must have an adequate expanse of firm, flat ground and no trees or overhead wires within a 35-degree arc centered on its periphery (as helicopters tend to land diagonally, not vertically). There must be no loose objects that the wind from rotors can pick up and throw around. These even include objects as large as a motorbike, as air currents can be strong during takeoff and landing. Finally, the news media will require an observation point, and this should be designated such that it gives an adequate view of the site without obstructing official movements and operations. In a major incident, news media operatives will pool their resources, such as video footage of the incident and interviews with key individuals, which will go some way to reducing their need for access to the site.

Communication and Collaboration

Figure 4 shows the full complexity of the response to a mass-casualty incident. The efficiency of operations will depend on that of information flows, and therefore on communications between the various elements shown in the diagram. Modern TETRA (terrestrial trunked radio) systems such as Airwave are robust, digital means of communication that embody a high degree of flexibility and interoperability. Indeed, interoperability is one of the keys to incident response. If local resources are insufficient, then the vital solution may be to invoke mutual aid agreements with neighboring authorities. These serve both to cover the needs generated by the incident and to ensure that normal operations are maintained when many personnel and resources are responding to the incident.

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See Also: Agency Notification and Mobilization; Backup Facility; Business Continuity Management; Command and Control; Crisis Communications; Decision Making; Emergency Management, Principles of; Emergency Management System; Emergency Medical Care; Health and Medical Response Scenarios; Incident Action Plans; Incident Management; Incidents Versus Crises; Interoperability; Perimeter Control; Reciprocal Agreement; Surge Capacity, Hospitals.

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Incidents Versus Crises

The term *incidents* differs from the term *crises*. The word *incidents* is commonly used to denote actions requiring immediate emergency responder attention, usually tactical operations.

The term *crises* denotes incidents wherein the required resources are not readily available or are beyond the capabilities of the organization responsible for providing immediate emergency attention. The term may also pertain to an incident seen as very serious, for example, an ethical or financial crisis at a private-sector corporation. This article clarifies the difference between an incident and a crisis with examples drawn from real-world situations.

In the field of emergency management, an incident is an unexpected occurrence such as a fire, a vehicle accident, or a natural hazard, such as a tornado, an earthquake, or a flood. The incident may also of human origin, such as a shooting or a terrorist attack. Though unexpected, such occurrences are not unpredicted. Authorities prepare to respond to a storm, an accident, or an attack by planning, training, and exercising. Though an incident may be predictable because of the history of prior incidents, it sometimes occurs with little or no warning. A hurricane warning provides greater time to prepare with the help of meteorological science and sophisticated tracking and early warning systems. A tornado provides less time for advanced warning, and a vehicle accident, a fire, a shooting, or a terrorist attack may provide no warning at all.

Incident Response

The vast majority of incidents are managed by a single resource or a small unit of resources. Law enforcement most often responds to an incident with one officer, whereas the fire service is more likely to respond with a team of firefighters assigned to a specific piece of apparatus. In either case, the incident is either resolved or escalated, in which case additional resources are required. As an incident develops, it may become a crisis if resources are unavailable or delayed.

In New York's Citywide Incident Management System (CIMS), all types of incidents are assigned to lead agencies. Establishing preassigned response lead agencies addresses issues of command responsibility. CIMS helps reduce the number of crises by identifying leadership roles prior to and during an incident.

There are escalating categories of incidents. Enrico Quarantelli defined emergencies, disasters, and catastrophes. The ascending order suggests that consequences of incidents increase from an emergency to a disaster and then to a catastrophe. Any one of these types of incidents could be a crisis if appropriate response capabilities are exhausted, overwhelmed, or unavailable.

Efforts to reduce the possibility of incidents becoming crises include such measures as mutual aid agreements, the Emergency Management Assistance Compact (EMAC), and memoranda of agreement (MOA) or memoranda of understanding (MOU) between two or more organizations. Incidents occur daily, and most are handled by local authorities without escalation or attention from the media. Those that escalate into larger incidents, or possibly crises, often require multiple agencies from more than the affected jurisdiction.

Types and Categories of Crises

Crises are occurrences requiring greater resources than may be immediately accessible or available. Whether a natural disaster, a human-made disaster, or a threat to an organization's reputation, crises are managed to reduce risk of further damage. The most familiar crises are large-scale natural disasters, such as a flood, hurricane, or earthquake. Such disasters may destroy critical infrastructure or block emergency response routes, which creates delays in fixing the problem. The Stafford Act provides a system of escalating requests for assistance by the federal government when local or state resources are exhausted.

There are many types of crises. Ian I. Mitroff, Edward S. Devlin, Steven Fink, and others have created tables or lists that contain all or some of the following specific problems: a product issue, a negative public perception of an organization, a financial problem, an industrial relations problem, an adverse international event, workplace violence, or the sudden loss of senior executives. There are also categories of crises: economic, informational, physical (facilities), human resource, reputational, psychopathic acts, or natural disasters. All of these situations may require special crisis management response expertise.

There are also incidents that may become crises without endangering anyone's life or safety. An example is an ethical crisis in which an organization is vulnerable to reputational damage as a result of the poor conduct of an employee or executive. Similarly, product tampering or equipment failure may create crisis conditions for an organization. Examples exist in banking, politics, religion, college athletics, and nuclear power entities when the actions of one or more persons impact the entire organization and its stakeholders. Public affairs personnel treat such incidents as crises because of the vulnerability they present to the organization and its reputation.

A crisis can be good or bad. In either case, the capabilities of the responsible party are strained or exhausted. In the simplest form, a good crisis might be the unexpected arrival of a busload of high school students at a popular fast food restaurant when minimal staff are on duty. The arrival may mean increased income for the business, while it may be a crisis for employees whose resources to serve the customers well are strained or inadequate. A crisis considered to be negative, bad, or detrimental could be a fire in a crowded building, a vehicle accident on a desolate stretch of highway, or flooding from a dam failure. In each case, the resolution of the incident may not resolve the threat of danger fast enough to protect life, property, or the environment. Anyone who might suffer from the impact of the impending threat will see the incident as a crisis.

In the private sector, crises may include labor strikes, loss of proprietary information, loss of critical physical infrastructure (buildings, data centers), workplace violence, damaging rumors, product tampering, hostage taking, or any natural disaster that interrupts business activity.

Four Basic Management Steps

Crisis management differs from incident management. While incident management is often structured through the use of incident-management systems, such as the Incident Command System (ICS), crisis management is often subject to a set of policies or detailed crisis plans, especially in the private sector. Devlin simplified basic incident and crisis management by proposing the following four steps for managing a crisis:

1. Take charge quickly
2. Determine the facts
3. Tell your story
4. Fix the problem

These steps pertain to various aspects of responding to a crisis or an incident. In incident management, an officer on scene might take charge quickly, possibly transferring command later to a supervisor or an incident commander. In the private sector, taking charge may be a function of the chain of command or policy. An employee first on the scene, or first to become aware of the crisis, may only report it to a superior rather than taking any other action. In a "size up," responders determine the facts as quickly as possible, especially those pertaining to safety. Greater analysis of a crisis may be required to determine either the cause or the full extent of the damage. The possibility of subsequent damage, such as a tsunami following an earthquake, is also assessed when determining the facts.

Public information officers or public affairs personnel are charged with and specially trained to "tell the story" to a variety of audiences and stakeholders. Special training or experience is best when communicating to the media. There have been instances where a report to the media has escalated a crisis rather than resolving it. Such instances have occurred in coal mining accidents, hostage situations, and product tampering. In the Incident Command System, operations section personnel will fix the problem at most incidents. They have the training to perform tactical operations. If the execution of any one of the four steps is beyond the capabilities of the responsible responders, a crisis may ensue and increase.

Catastrophes and Disasters in U.S. History

Emergency management historians and scholars list incidents spanning the 18th through 21st centuries in the United States. These may include the 1900 hurricane in Galveston, Texas; the 1906 San Francisco fire and earthquake; the 1918 flu pandemic; the 1927 Great Mississippi Flood; the Dust Bowl storms in the 1930's; the 1933 Long Beach, California, earthquake; the 1947 Texas City explosions; the 1992 Los Angeles riots; the 1999 Columbine High School shootings; the terrorist attacks on September 11, 2001; the 2001 anthrax poisonings; Hurricane Katrina in 2005; the 2011 Joplin, Missouri, tornado; and the Aurora, Colorado, movie theater shootings in 2012.

Though the list is not comprehensive, in each case local emergency response capabilities were strained or exhausted, which caused each incident to reach beyond an emergency to attain the level of either a disaster or a catastrophe, and each escalated from incident to crisis. Moving from an incident to a crisis may involve immediate needs, or the crisis may develop during the course of supporting an immediate response, such as when a hospital receives victims in need of emergency care. Similarly, a crisis might develop during a power outage in which the immediate impact is loss of lighting, air conditioning, heating, or critical equipment. Such an incident becomes more serious and may move to the crisis level if the restoration of power takes longer than expected.

In emergency management, the term *event* is often used in place of incident, but these words are not the same. An event more commonly refers to a human-made "planned event," such as the Super Bowl or the Thanksgiving Day parade in New York City. Both events are planned well in advance, but they require much of the same planning, training, and exercising to prepare responders should the event become an incident or should something unexpected interrupt the flow of the event. If the occurrence or interruption is serious, a crisis may develop because of any difficulty or delay in obtaining the required resources to resolve it. An example of an event turning into a crisis would be a large concert in an arena (planned event) without adequate fire suppression systems or clearly marked evacuation routes.

Benefits of Differentiation

The benefit of differentiating between the terms "incidents" and "crises" is found in crisis communication and emergency response. It is also important in compiling statistics wherein data on the frequency and level (severity) of occurrences informs resource deployment and acquisition. Planning the budget for tactical response operations and crisis management functions may depend on accurate statistical data revealing the need for one or the other. Staffing levels in management positions may vary, and staffing in tactical operations may vary depending on the number, severity, and frequency of either incidents or crises. For example, a law enforcement agency with data supporting multiple incidents with adequate response may maintain its current budget for patrols. The same organization, recognizing from the data that there were serious reputational issues regarding how incidents were handled, might increase the budget to provide additional personnel or systems to handle crisis management. Response may have been excellent at an incident, but public perception of the response may have created a reputational or trust crisis. Knowing the difference between the two is important and may influence critical decisions.

Finally, knowledge and comprehension of terminology leads to effective application, analysis, evaluation, and judgment. When the terms are clear, the decisions, actions, and consequences are more likely to be understood by all involved. Clarification of incidents versus crises promotes understanding and successful crisis management.

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Independent Scholar

See Also: Catastrophe, Definition of; Coping Capacity and Response Capability; Crisis, Definition of; Crisis Communications; Crisis Information Management Systems; Crisis Management, Emerging Trends in; Disaster, Definition of; Disaster Assessment; Disruption of Organizations; Emergency, Definition of; Emergency Management Systems; Emergency Public Information; Fink's Crisis Life Cycle; Incident Management; Mitroff's Five Stages of Crisis Management; Mutual Aid and Assistance; Reputational Risk; Routine Emergencies Versus True Crises; Spokesperson, Designating and Utilizing; Stafford Act.

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Income Inequality and Labor Unrest

Labor unrest defines a broad category of actions taken by workers, especially collectivized as unions, to express their dissatisfaction with employers, including striking and picketing, as well as violent actions like riots and the uprising of the Luddites during the Industrial Revolution. This underlying dissatisfaction can sometimes be encouraged by or correlated with economic inequality, because a significant disparity of wealth between workers and employers implies that the workers have not been proportionately compensated for the wealth they have generated for others. Historically, this has been most true in working-class, nonfarming communities, where major employers include manufacturers or mines; although there is no reason to consider it less true when the workers are in the service industry, for instance, or are white-collar office workers, the history of labor action is more strongly associated with the exploitation of industrial workers.

Inequality is more sharply felt during times of overall recession. In 2012, for instance, the United States was more than four years into an extended financial crisis in which unemployment was high across all demographic sectors, housing values had fallen, and conventional middle-class expenses like education and childcare had skyrocketed; at the same time, stock indices were at near-record highs, corporate executive earnings were the highest they had been in recent memory, and many wealthy employers paid the same effective tax rate or less than their lowest-paid employees.

Labor unrest was rampant in the 1870s. After the expense and chaos of the Civil War, in places outside the Reconstructed south the railroads brought great prosperity to capitalist business owners, and the United States began to take the lead in the Industrial Revolution. This was the age of America's first industrial tycoons, the first Americans to become truly and overwhelmingly wealthy from business—men like Andrew Carnegie, Cornelius Vanderbilt, Jay Gould, and John D. Rockefeller, whose name has been synonymous with wealth ever since.

Railway workers and coal miners, whose labor laid the foundation for this prosperity, were the first to demand better treatment, and their protests ranged from reasonable pursuits like the creation of political parties, labor unions, and lobbying groups, to the shameful massacres of Chinese workers (who were hired to work at much lower pay than whites, and often replaced whites, who were then left without work) in the northwest. Labor agitation in Chicago led to the Haymarket bombing and shoot-out of 1886, in response to which American labor unions became better organized and more professional, but were unfortunately associated in the public mind with terrorism for the next several decades. At the end of the 19th century, only 3 percent of the population belonged to a labor union; as the country urbanized in the first decades of the 20th century, labor unions saw prolonged steady growth, and labor strikes were treated more frequently as a reasonable bargaining tactic rather than being described as quasi-criminal acts of economic obstruction, as industrialists had depicted them in the 19th century.

Economic Inequality and Happiness

A 2011 study published in *Psychological Science*, based on survey data from 1972 to 2008, found that Americans as a whole were significantly happier when the wealth gap was smaller, and that there was a relationship in those years between American happiness and the perception of fairness and general trust. The study offered an answer to the question often raised by social scientists: Given that American national wealth had grown significantly over the second half of the 20th century, why did American happiness decline instead of increase? The growing income inequality would seem to be the answer, particularly as happiness did increase in European countries where economic growth was matched by growth or stability in economic equality.

Is there a causal link between people's unhappiness about economic inequality and labor unrest? Science suggests there is, and that the observed correlation in history is not coincidental. In a study published in *Nature*, scientists trained monkeys to collect pebbles for them in exchange for cucumbers, prompting the monkeys to harvest pebbles in return for food. The system seemed stable. When the scientists began giving some monkeys grapes (a preferred treat over cucumbers), while the rest of the monkeys continued to get cucumbers, the economy collapsed: The overwhelming majority of the monkeys ceased collecting pebbles, even though previously cucumbers had been treated as a sufficient incentive. (Some may have predicted that the monkeys would collect more pebbles in the hope of getting grapes, but this proved not to be the case.) This may imply that dissatisfaction with perceived unfairness is an evolved, instinctual response—not one acquired through human culture.

Historically, there is a general inverse relationship between unemployment and income inequality; that is, the more people are unemployed, the greater the gap is between rich and poor. This is true even of the working class—that is, when unemployment is high, workers' wages are disproportionately low relative to the wealth of the upper class. A simple explanation, undoubtedly only one factor, is that when unemployment is high, employers have little incentive to raise wages, either in the form of entry-level wages or of raises to existing employees. When there are not enough jobs to go around, workers have little choice but to take what they can get.

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See Also: Bankruptcy, Corporate; Blame, Politics of; Budget Crisis; Commodity Shortages; Debt Crisis; Poverty; Protest; Stock Market Crises; Strikes.

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Infectious Disease

Infectious disease is any infection or disease caused by certain microbes (called pathogens), such as viruses, bacteria, fungi, parasites (including protozoa and helminths), and atypical proteins known as prions. (Viruses are not considered microbes by strict definition but are included in this discussion.) Infectious disease is determined by the presence of a pathogenic agent and the common symptoms (some are asymptomatic in humans) for the particular microbe. Not all microbes are harmful, and many are beneficial, to humans. Microbes live almost everywhere in/on humans, soil, water, or plants. Globally, infectious disease is the leading cause of child and adolescent mortality and a significant contributor to adult mortality. Six infectious diseases account for about 82 percent (12 million out of 14.7 million) of the deaths, which are lower respiratory infections including pneumonia, influenzas, and acute bronchitis (3.9 million); HIV/AIDS (2.8 million); diarrheal diseases (1.8 million); tuberculosis (TB) (1.6 million); malaria (1.3 million); and measles (about 1 million). Most of these are preventable or treatable diseases. Infectious diseases are spread by direct and indirect contact, typically from human to human, and by vectors, and include various zoonotic diseases (animal to human transmission).

Historic Infectious Disease Pandemics

Throughout history, infectious diseases have been responsible for many pandemics. For example, the black death (or bubonic plague) was a vector-borne illness that killed 25–50 percent of the European, African, and Asian populations in five years (1347 to 1352). Black death is spread by a vector (flea) that has been infected with the bacterium *Yersinia pestis* and then bites a human, giving him or her the infection that spreads to lymph nodes, which swell. In the 18th century, smallpox killed over 60 million Europeans and killed over 75 percent of children under 5 years of age. Smallpox is caused by one of two variants: variola major or minor. TB is caused by the microbe *Mycobacterium tuberculosis*, which throughout the 19th century killed about 25 percent of Europe's adults. The 1918 influenzavirus A H1N1 (called Spanish influenza) pandemic was estimated to have infected over a quarter of the world's population and resulted in 50 million deaths.

Modes and Routes of Transmission

There are several modes of infectious disease transmission, such as contact, vehicle, and vector. Contact involves direct, indirect, and droplet transmission, whereas vehicle transmission includes airborne, waterborne, and food-borne transmission. Vector transmission involves mechanical and biological transmission. Infectious disease is directly transmitted in two ways: horizontal and vertical disease transmission. Horizontal transmission involves one host transmitting to another via direct or indirect contact, whereas vertical transmission is passing the pathogen from parent to child (across the placenta in utero, during labor, or through breast milk).

Pathogen survival necessitates they be transmitted from one host to another, and they are typically specialized around a specific route of transmission. Routes of transmission include respiratory, gastrointestinal, physical contact, through vectors, fecal-oral, fomite, or an intermediate host (e.g., eating undercooked bear or pig meat [trichinosis]). Some microbes, such as chicken pox or anthrax, can utilize more than one transmission route.

Contact Transmission

Contact transmission requires the new host to come in direct or indirect contact with the pathogen. The direct route is commonly through physical contact. An example of direct contact transmission is sexually transmitted infections (STIs) (formerly called sexually transmitted diseases [STDs]). STIs are diseases acquired during vaginal, anal, or oral sex (less common). During sexual intercourse, infectious bacteria or sores make physical contact and can be transmitted from the infected to the noninfected. Infected secretions, such as semen or vaginal lubrication, can gain access to another person's bloodstream through tiny fissures in the penis or tears in the vagina or rectum. Examples of STIs include bacterial (i.e., chlamydia, gonorrhea, syphilis), viral (hepatitis B, herpes, human papillomavirus [HPV]), fungal (yeast infection), parasites (crabs), and protozoal (trichomoniasis).

Indirect contact is when a susceptible person comes in contact with a pathogen-contaminated object or surface and acquires an infection. An example is fomites, which include doorknobs, countertops, medical instruments, eating/drinking utensils, keyboards, toys, towels, pens, books, and/or money. Common infectious diseases spread by fomites are the common cold, diarrhea, methicillin-resistant Staphylococcus aureus (MRSA), conjunctivitis, measles, lice, pinworms, and influenza. Many of these diseases are also transmitted through direct contact. Another example of indirect transmission is iatrogenic transmission (e.g., a type of nosocomial infection), which happens when a pathogen is introduced to the human during a medical procedure, such as a surgery, organ transplantation, or blood transfusion. Examples include Creutzfeldt-Jakob disease (CJD), HIV/AIDS, hepatitis B, and malaria.

Droplet and airborne transmission both utilize the respiratory route; however, droplets require close contact to infect others because they travel shorter distances (about a meter) and are larger (more than 10 micrometers) than the airborne transmission. In contrast, airborne transmission of viruses and bacteria can cover considerable distance on dust particles. Under the right temperature and humidity conditions the mucus coating of influenzavirus evaporates, resulting in the virus staying airborne. The respiratory route involves inhaling the infected aerosolization (i.e., the person speaks, coughs, sneezes, laughs, and even sings) of airborne droplets. Droplets can enter the body through the eyes, mouth, and/or nose. Common examples include the common cold, influenza A and B, pertussis (whooping cough), TB, measles, and bacterial meningitis.

Vehicles

Vehicles are when the pathogen is brought into the body, commonly through the air, water, or food. A common pathogen airborne transmission route is the respiratory route. Waterborne and foodborne transmissions utilize the gastrointestinal system. When a person ingests contaminated food or water, the pathogen enters the digestive system, where it multiplies and causes illness. After being infected, the person can shed the pathogen via feces, which can infect others. An example is fecal-oral transmission (also a direct contact) route, which results from food preparers not washing contaminated hands and preparing food that is ingested by another person or when untreated sewage or fecal matter has contaminated drinking water and is drunk by a person. Eating fish or shellfish that lived in contaminated water is another route. Common food and waterborne illnesses are salmonella, campylobacter, shigella, *E. coli*, *Bacillus cereus*, tapeworms, and prions. Prion disease (mad cow disease in cows, scarpie in sheep, and CJD in humans) is a degenerative brain disorder resulting from abnormal proteins, which can be from eating contaminated tissue, an inherited disease, or from iatrogenic transmission.

Vectors

Vectors carry pathogens from one host to another via mechanical or biological transmission. A mechanical vector transfers a microbe from one host to another but is unnecessary for the parasite's life cycle. An example is a housefly that lands on pathogen-containing feces. The feces gets on its appendages. The fly then lands on human food, whereby the pathogen is ingested. What makes this mechanical is that the pathogen never entered/lived in the fly. A biological vector transfers a microbe from one host to another and is necessary for the parasite's life cycle. An example is a mosquito with plasmodium parasite (causes malaria), and the parasite requires both the mosquito (vector) and a human (host) to complete its life cycle. The most common vector is mosquitoes (females), which transmit malaria, dengue fever, yellow fever, West Nile virus, and Rift Valley fever. Other common vectors are flies, mites, fleas, ticks, rats, and dogs. Examples of vector-borne disease are African sleeping sickness, viral encephalitis, babesiosis, Chagas disease, Lyme disease, plague, rabies virus, scabies, and tularemia.

Infection Classification

Infectious disease illness is dependent on the interaction between the body's immune system (to defend/resist) and the pathogen's ability to infect. A pathogen's ability to infect is classified as primary or opportunistic infection. A primary infection is illness/disease caused in healthy people, whereas an opportunistic infection is disease caused in unhealthy people (i.e., those with a weakened immune system) and rarely in healthy people. Pathogens can be either contagious (easily transmitted), virulent (malignant and/or lethal), and/or both. A further distinction is whether the pathogen caused an infection and disease. An "infection" is when a pathogen invades and multiplies/grows (colonization) in the body. A "disease" is based on the pathogen's ability to invade tissue (invasiveness) and produce toxins (toxigenesis). The human immune system can defend against a pathogen infection, but if this fails or the immune system is overwhelmed, the development of a disease is a possible outcome.

Prevention, Diagnosis, and Treatment

Prevention of infectious disease requires understanding the microbe and using appropriate means to inhibit multiplication and spread. Basic prevention strategies (not applicable in all situations) include vaccinations, chemoprophylaxis, universal health precautions, practicing strict barrier procedures, avoiding direct contact with blood and/or bodily fluids, disinfection, vector avoidance/control measures, and even quarantine. Prevention strategies are based on recognizing its virulence, contagiousness, and range.

There are many different ways to diagnose infectious disease, both directly and indirectly. One of the most common diagnosis tools is a physical examination along with a clinical presentation of specific symptom constellations. Direct diagnosis/confirmation tests include microbial cultures, microscopic examination (light or electronic), biochemical (serological and immunoassays), and molecular diagnostics (polymerase chain reaction [PCR], reverse transcription polymerase chain reaction [RT-PCR], nucleic acid sequence-based amplification [NASBA]). Other direct tests provide images of internal abnormalities, such as magnetic resonance imaging (MRI), and computed tomography (CT) and positron emission tomography (PET) scans.

Treatments are categorized broadly into two types of antimicrobials: microbistatic or microbicidal. Microbistatic antimicrobials operate by hindering the replication of the pathogen, whereas microbicidal antimicrobials kill the microbe. For example, bacteria are prokaryotes, and antibiotics used for treatment either kill the microbe (bactericidal) or inhibit its growth (bacteriostatic). Some examples of bactericidal antibiotics include penicillins and fluoroquinolones, whereas examples of bacteriostatic antibiotics include tetracyclines and sulfonamides. Treatments for viral diseases are generally focused on lessening the symptoms and waiting on the immune system response or host death. There are a couple of antiviral drugs (microbistatic) available. For example, acyclovir is used to treat herpes outbreaks. Another antiviral is AZT, which hinders HIV from replicating.

Fungal and parasite (protozoa and helminths) diseases involve a different treatment process from bacteria and viruses, because fungi and humans are eukaryotes. Both antifungal and antiparasitic treatment/drugs seek to expel or kill the fungi or parasite without causing harm to the infected host. These treatment/drugs can have side effects. Antifungal drugs work by hindering the fungi's ability to replicate. Anthelmintics are a class of drugs (benzimidazoles, diethylcarbamazine, etc.) that expel parasitic worms (helminths) from the intestinal tract by either vermifuges (disorienting them) or vermicides (killing them). Natural antihelmintics include tobacco, garlic, and pineapple.

Over the years, antimicrobial medications have been used extensively, and microbes have been adapting, rendering treatments less effective at inhibiting and/or killing the microbes. These are drug-resistant microbes, which include almost all staphylococcal strains (resistant to penicillin), HIV/AIDS, malaria, and TB. Drug-resistant microbes require more advanced treatments, and people are experiencing longer illnesses and higher mortality. Another emerging issue is superinfection. A superinfection is a new bacterium, virus, or fungal infection or coinfection that develops during antimicrobial treatment.

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See Also: Ebola Virus; Epidemics; HIV/AIDS Epidemic; Influenza; Malaria; Measles; Pandemics; Quarantine; Severe Acute Respiratory Syndrome (SARS); Tuberculosis; Vaccinations.

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Infestations, Parasite

An infestation is a state of being invaded or overrun by parasites. Parasites are plant or animal organisms that are metabolically dependent on other organisms (a host) to live, feed, or reproduce. Parasites, such as protozoa, helminths, arthropods, fungi, or bacteria, can cause infestations or an infection. Infestations are categorized by whether the parasite is located on the skin or inside the host.

The medical definition of an infestation differentiates parasites into two groups. The first group of parasites lives and feeds on the surface or in the pores of the skin and is called ectoparasites (i.e., external parasites). Ectoparasites' life on the host can range from a brief period of time to the entire life of the parasite. Common examples are lice, fleas, bedbugs, mites, and ticks. Ectoparasites do not generally cause disease but can be the vector for transmitting diseases. In medical terms, ectoparasites are an infestation. The second group lives, feeds, or reproduces inside the human body and is called endoparasites (i.e., internal parasites). Common examples are helminths (i.e., tapeworms, pinworms, and roundworms) and protozoa (i.e., giardia and cryptosporidium). Each endoparasite has a specialized location within the host, with many inhabiting the intestinal system. For example, the tapeworm uses its mouth, equipped with suckers with hooks (scolex), to anchor/attach to the intestinal wall of the host. In medical terms, the presence of endoparasites is called an infection, not an infestation.

Lice

Three types of lice that affect humans are head, body, and pubic lice (commonly called crabs). Lice are generally specialized to one host but can move from one host to another. Both male and female lice feed on blood. Adult lice are 0.08 to 0.13 of an inch (2.1–3.3 mm) in size. Head lice are a global problem and found in every geographic region. Annually, in the United States, 6 million to 12 million infestations occur, mostly affecting children aged 3 to 11 years. In the United States, head lice infestations are less common in African American communities than in any other ethnic group. The infestation rate among children in developed countries is between 2 and 10 percent. Globally, the infestation rate average is approximately 10 to 25 percent, with some regional variation ranging from as low as 5 percent to as high as 90 percent. Body lice are similar to head lice, except they infest the body and clothes. Pubic lice or crabs infest the pubic region of adults and the eyelashes of children. Adult transmission is primarily from sexual contact of an infested person with a noninfested person.

Head lice are transmitted by head-to-head contact, such as through the bedding, towels, hairbrushes, or combs of someone who was infected, and/or via the infected person's clothing. Management includes laundering the infected person's clothing and bedding in hot water and drying them with high heat. Items that cannot be washed are quarantined by placing them in sealed plastic bags for at least two weeks. Combs and brushes are disinfected in hot water. Adults with head lice should wash their hair with a shampoo containing pediculicides in a two-treatment cycle spaced up to 10 days apart. The lice eggs (called nits) should also be removed manually with a fine-tooth comb.

Body lice are treated by regular changes into laundered clothes and improvement of hygiene, such as regular bathing. There are a number of over-the-counter lotions, mousses, and shampoos, as well as prescription medications, for the treatment of pubic lice. The appropriate chemical treatment of all lice for adults and especially small children and pregnant women requires consultation with a physician, since many treatments are toxic and can have severe side effects.

Fleas

A flea is about 0.03 to 0.09 of an inch (1–2.5 mm) in size and feeds on blood. Some common types of fleas are the cat, rat, and human flea. People in North America are most likely to be bitten by a cat or rat flea, because the human flea is not common. The bites of fleas cause itchy papules, generally in groups of three, with some people having an allergic reaction to the bites. Fleas are a common vector for transmitting bacterial (typhus), viral (myxomatosis in rabbits), protozoan, helminth, and rickettsial parasites to animal and humans. Fleas have been involved in several epidemics throughout history, with the most widely known being the black death (or bubonic plague). The black death was spread by fleas that were infected with the bacterium *Yersinia pestis*, which killed 25 to 50 percent of the European, African, and Asian populations between 1347 and 1352. The fleas acquired *Yersinia pestis* from feasting on infected rats and then infested humans by biting them.

Removal of fleas from living areas requires the use of an insecticide by a trained professional exterminator. The use of over-the-counter foggers is considered limited in its effectiveness. Itching from fleas bites can be relieved with calamine lotion or hydrocortisone creams.

Bedbugs

Bedbugs have made a comeback since the 1980s and are found throughout North America, Europe, and most Asians countries. They were almost eradicated in developed countries in the 1940s. The most common bedbugs are species of *Cimex lectulariu* and *Cimex hemipterus* (tropical origin) of the Cimicidae family. A bedbug has six legs, and an adult is about the size of an apple seed. Bedbugs feed mostly at night on human blood. A bedbug bite causes itchy red papules resembling a rash, with some people having an allergic reaction to the bites. Although bedbugs can be infected with over two dozen pathogens, they are not known to transmit disease to humans.

Bedbugs can be challenging to remove from a living area because they can survive for several months without eating. Removal of bedbugs from a living area requires the use of a pesticide by a trained professional exterminator. Nonchemical treatments include vacuuming the cracks and crevices where they are prone to hide, such as picture frames, the lips of mattress seams, furniture, and under electrical outlet plates. Bedding and clothing should be washed in hot water (at or above 120 degrees F (49 degrees C) and placed in a dryer for at least 20 minutes. Heavily infected mattresses or furniture should be discarded. Itching from bedbugs can be relieved with calamine lotion or hydrocortisone creams.

Mites

Acarology is the name of the scientific field that studies mites and ticks. Mites are similar to insects but have eight legs as adults (six in the larva stage). Both mites and ticks go through four stages of development, which are egg, to larva, to nymph, to adult. There are about as many types of mites as insects. Some mites help decompose recently dead plants and animals, others infest plants, and still others attack insects and arthropods. They also bite humans and animals, causing skin irritations. Mites are tiny, with most being around 100 to 600 microns. The average size of a dust mite is 6 to 10 microns.

Some of the most common mite infestations are dust mites and scabies. Dust mites feed on human skin flakes and are not visible to the human eye. The feces and body appendages of dust mites can cause allergic conditions, such as rhinitis (hay fever), itchy eyes, running nose, eczema (skin rashes), and coughing. Exposure to a significant dust mite infestation can result in children developing asthma as well as triggering asthma attacks.

Treatment of dust mites is to reduce their population. Examples include dustproof or allergen-blocking bedding, regular vacuuming (a HEPA-filtered vacuum is recommenced), washing of bedding, and dusting of the house (at least once every week).

Scabies mites cause scabies and are a global problem. Worldwide, there are an estimated 300 million cases of scabies annually. Globally, the infestation rate average is approximately 1 to 10 percent, with population variation ranging up to 50 to 80 percent. The scabies mite burrows in the skin and deposits eggs. Once an egg hatches, a larva comes out of the burrow, moves across the host's skin, and repeats the cycle. Scabies mites are nocturnal. Persons with scabies can be asymptomatic and able to transmit the infection to others. Scabies are commonly transmitted by direct skin-to-skin contact with an infected person. Norwegian scabies (called "crusted") can be spread by brief skin-to-skin contact or by using an infected person's bedding, clothing, and/or furniture. Appearance of scabies requires the household or all those occupying the same living area to be treated concurrently. Bedding and clothing are washed in hot water (at or above 120 degrees F [49 degrees C]) and dried with high heat. Items that cannot be washed are quarantined by placing them in sealed plastic bags for several days or up to one week. Institutional outbreaks are more problematic and are generally difficult to control. There are scabicides available, but they require a prescription.

Hard and Soft Ticks

Ticks are eight-legged blood-sucking organisms that are found throughout the world. Some species of ticks (a relative to mites) can grow up to one-quarter inch in length. Although ticks can attach anywhere on a human, the preferred areas are in the pubic and anus region, armpits, behind the ears, and hairline. There are two families of ticks, which are hard (Ixodidae) and soft (Argasidae). Hard ticks have a hard shield behind their mouth that is visible. Examples of hard ticks include the dog, deer (also known as black-legged tick), Western black-legged, brown dog, Gulf Coast, lone star, and Rocky Mountain wood. Soft ticks lack the hard shield behind their mouth, do not have a scutum (shield), and primarily feed (infest) on birds. Examples include the common fowl and relapsing fever tick. The hard type remain attached to the host for several days of feeding, whereas the soft tick feeds more quickly and drops off the host.

Most bites from ticks do little to humans, but some ticks can transmit viruses, rickettsiae, bacteria, and protozoa microbes that cause human disease. For example, Rocky Mountain spotted fever (RMSF) can be transmitted by the dog, brown dog, and Rocky Mountain wood ticks; and Taiga encephalitis (brain inflammation), endemic in former Soviet Bloc countries and central Europe, is transmitted by the groundhog, taiga, and sheep ticks (i.e., ixodid ticks). The dog, wood, and lone star ticks are responsible for the transmission of tularemia, commonly known as rabbit fever. Besides ticks being a vector for disease, there are over 40 species of ticks that can directly transmit a neurotoxin via their salivary glands to humans, causing the condition of tick paralysis. Some examples of these paralysis-inducing ticks include the dog, scrub (Australia), and Rocky Mountain wood ticks.

When in heavily tick-prone areas, people should examine areas on the body where ticks commonly attach, such as behind ears and knees, armpits, head, and groin area. An attached tick can be removed with a tick remover or a pair of tweezers, focusing on removing the head and mouthparts.

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See Also: Epidemics; Infectious Disease; Living Modified Organisms; Malaria; Pandemics; Public Health Surveillance; Quarantine; Social Distancing.

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Influenza

Influenza (called the flu) is a highly infectious respiratory disease caused by three different strains of the influenzaviruses (A, B, and C) that circulate worldwide. This acute viral infection is characterized by inflammation of the nasal mucosa, throat (pharynx), and conjunctiva. Globally, influenza causes 4 million cases and 250,000–500,000 deaths every year. In the United States, seasonal influenza affects around 5 to 20 percent of the population, with 200,000 people hospitalized as a result of complications and 36,000 deaths.

The influenzaviruses are consistently evolving and changing because they are genetically unstable. For example, influenzaviruses are made up of eight distinct segments of RNA; they are unable to repair errors (mutations) that occur during reproduction. Influenzavirus evolves two ways: antigenic shift and drift. Antigenic shift occurs only sporadically and is a sudden significant change in viruses' glycolproteins (e.g., hemagglutinin [HA] and/or neuraminidase). Antigenic drift is a continual gradual process with deviations to the viral structures, which can infect persons who lack antibodies to the new variant. Influenzavirus A can undergo both kinds of changes, while type B and C viruses change by antigenic drift. Influenzavirus A can undergo antigenic shift because it can genetically reassort (i.e., mixing of HA of human/avian/pig strains), cross the species barrier, and also reappear after being dormant. All new strains can cause seasonal outbreaks, regional epidemics, or less common pandemics based on antigenic variation and ability to spread, and can cause serious illness to those lacking immunity.

Pandemic Outbreaks

Since the 20th century, the world has seen four pandemic viruses: the 1918 H1N1 (Spanish influenza), the 1957 H2N2 (Asian influenza), the 1968 H3N2 (Hong Kong influenza), and the 2009 novel H1N1 (swine flu). All humans are susceptible to the three strains, but influenza A is the most virulent and historically responsible for pandemics. Of these four pandemics, only the 1918 virus has been associated with excessive mortality. The 1918 pandemic was estimated to have infected over a quarter of the world's population and conservatively resulted in 50 million deaths. Many reports claim people died within hours of becoming ill. Differing from other influenza, deaths from the 1918 strain were highest among adults under 50 years of age, rather than children or the elderly.

The 1957 and 1968 influenzavirus A are suspected to be the result of a genetic reassortment (antigenic shift) of the avian and human viruses. This new H2N2 variant of 1957 circulated until 1968, when it was replaced by the Hong Kong virus (H3N2). Globally, the 1957 influenza estimated mortality was 2 million, while the 1968 strain estimated mortality was 1 million. Some scientists hypothesize that those infected by the 1957 variant were partially immune to the 1968 variant. In addition, five of the eight RNA sequences of the modern H3N2 influenza virus have their origin in the 1918 variant.

The novel H1N1 influenza of 2009 originated in Veracruz, Mexico, and was an unusual genetic reassortment of swine, avian, and human influenza. This novel strain likely originated from an intermediate host, like a pig. The novel H1N1 variant was not as severe as the early reports said. Like the 1918 pandemic, 80 percent of mortality was among those under 65 years of age. It also affected children and young adults at a higher rate than typical seasonal flu. Some have theorized that those born before 1950 may have acquired immunity to the new H1N1 virus from the previous H1N1 of 1918. This novel H1N1 has now mostly replaced the former H1N1 virus.

Influenza Strains

Influenzavirus A can infect humans, wild birds (aquatic birds, i.e., ducks, geese, terns, etc.), pigs, horses, dogs, cats, domesticated birds (chickens, turkeys, pheasants, etc.), and recently discovered fruit bats. Influenzavirus A from aquatic birds does not grow well in human cells, and vice versa. However, both avian and human influenza

A hog shown in the Spotted Swine class rests at the Minnesota State Fair's swine barn, August 27, 2012. Although a University of Minnesota epidemiologist recommended pigs be banned from the fair and other public events because of concerns about swine flu, fair and health officials chose to keep the pig barn open, citing the low number of state cases. By September 5, three cases of influenza were confirmed to be linked to the fair. A woman whose grandson showed fair hogs was treated for the H1N2 strain and released.

replicate better in pigs. Influenzavirus B is less severe than type A and almost exclusively found in human populations, can cause illness, death, and even epidemics, but not a pandemic. Influenzavirus C is a milder illness than A and B and has not caused an epidemic or a pandemic. Only influenza type A viruses are classified into subtypes, while B viruses are classified by strains.

Influenzavirus A Subtypes

Influenzaviruses A are classified and identify by two glycoproteins: hemagglutinin (HA) and neuraminidase (NA). There are 16 known HA and nine known NA subtypes, with many possible combinations of HA and NA proteins. For example, H3N2 is a subtype of influenza A and the HA has three proteins while the NA has two proteins. Likewise, in H1N2 virus the HA has one protein and the NA has two proteins.

The influenzavirus A subtypes that affect humans are H1N1, H1N2, H2N2, H3N2, and H10N7. Influenzavirus A H1N1 caused the 1918 and 2009 epidemics. H1N2 is a reassortment of the presently circulating H1N1 and H3N2 subtypes. Specifically, the H1N2 virus HA protein is similar to the H1N1 viruses, and its NA protein is similar to the H3N2 virus. The new H1N2 variant is similar to seasonal influenza in illness and outbreak potential.

H3N2 can infect humans, birds, and mammals. Since 2006, H3N2 has been increasingly resistant to the adamantanes antiviral drugs. In human populations, H3N2 is a common virus resulting in about 30,000 U.S. deaths annually. The origin of H3N2 was an antigenic shift of H2N2 in 1968. In 2011, a new variant was found, which was called H3N2v. Egypt in 2004 reported H10N7 in humans for the first time after the deaths of two children.

The influenzavirus B is less common than A and is mostly found in human populations, but also in ferret and seal populations. Type B has a lack of antigenic diversity, has limited hosts, and has a slower mutation rate when compared to type A—which are a few of the reasons it does not cause pandemics. Even though humans are exposed to type B early in life, it mutates enough over time that lifetime immunity is unlikely. Influenza C has triggered small localized outbreaks among children in Japan and California, but because of its low genetic diversity, it is unlikely to trigger an epidemic or pandemic.

Swine Influenza Virus (SIV)

Swine influenza virus (SIV) is any influenza variant endemic in pigs. SIV causes most respiratory illnesses in pigs and circulates year-round. As of 2009, the known SIV strains included influenza C (rare) and the influenzavirus A subtypes found in pigs, which are H1N1, H1N2, H2N1, H2N3, H3N1, and H3N2. There are no reports of influenza B in pig populations. Most influenzavirus A and C types from pigs do not grow well in human cells, and vice versa. Although rare, since 1958 reassortment of pig and human strains is probable based on 50 documented cases of direct transmission of swine flu to humans. In 2004, H3N2, like the 2009 novel H1N1, was the result of an unusual reassortment of swine, avian, and human influenza. H3N2 influenza virus is suspected to be able to reassort with the avian H5N1 viruses in an intermediate host.

Avian Influenza Viruses (AI)

The natural reservoirs (hosts) for these all influenzavirus A subtypes are wild birds. Wild birds do not always become sick with influenzavirus A, but domestic poultry have commonly died from avian influenza subtypes (H5N1, H7N1, H7N2, H7N3, H7N4, H7N7, H9N2, and H10N7). Duck viruses have been linked to influenza outbreaks in whales, seals, horses, pigs, and turkey populations.

Avian influenzavirus A is classified by two types—low pathogenic avian influenza (LPAI) or highly pathogenic avian influenza (HPAI)—based on the molecular makeup and the viruses' ability to cause disease. The LPAI variants result in mild asymptomatic infection in poultry and symptoms from conjunctivitis to nonfatal respiratory illnesses in humans. The HPAI virus infections can cause severe illness in poultry and range from asymptomatic to fatal conditions in humans. The rare HPAI virus strains (H5N1, H7N3, and H7N7) have produced serious conditions ranging from conjunctivitis (H7N3, H7N7) to acute respiratory diseases and mortality (H7N7, H5N1) in humans.

The three main subtypes of avian influenza that infect humans and birds are influenza A H5, H7, and H9 (each has nine potential neuraminidase subtypes). H5N1 is a major pandemic threat, as the fatality rate of H5N1 in human populations is 50 to 60 percent; however, the current strain is limited in its human-to-human transmission. The present HPAI H5N1 virus circulating in Asia and Europe is endemic to poultry. Influenza A H7 can be transmitted from birds to humans through direct contact, but it is rare and is limited in human-to-human transmission (H7N7). H7 subtypes are considered as LPAI (e.g., H7N2, H7N7) and HPAI (e.g., H7N3, H7N7). The zoonotic likelihood of H7N7 is unusual. Influenza A H9 subtype is LPAI and rare in human populations. It was confirmed in 1999, but all three infected children recovered fully.

Prevention, Treatment, and Management

The best prevention against the influenza virus is vaccination. The annual vaccine includes the influenza A (H3N2, H1N1) and B viruses but not C. Every year, genetic changes occur to the dominant strains because of antigenic shift/drift, resulting in the need for a new vaccine. Vaccines take about six months to produce, and in some years, the antigenic shift/drift results in the new vaccine being ineffective. The introduction of influenza into overcrowded situations such as evacuation centers after a disaster will favor an outbreak, and the introduction of a virulent swine or avian influenza that is easily transmitted can trigger an epidemic and a possible epidemic.

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See Also: Epidemics; Infectious Disease; Pandemics; Public Health Surveillance; Quarantine; Social Distancing; Vaccinations.

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Information Asymmetry

The term *information asymmetry* describes a circumstance in which the parties involved in a situation—typically a transaction, as the term originates in economics—include one party who has more information or more accurate information than the other party or parties. Such asymmetries lead to imbalances of power, which can harm the least-informed party and may develop into deeper and more disastrous problems. The simplest example of an asymmetry is fraud, in which one party is swindling the other, but the term would not be broadly useful if this were the only case considered. For instance, in buying medical insurance, if the customer knows more about his/her medical condition than the insurer does—whether because of a preexisting medical condition, a hereditary propensity for a medical problem, or information deliberately hidden, such as a smoking habit—then the insurer is in a position in which the rates set will not be fairly matched to the risk of payout taken on. The same is true if the insurer is aware of information about the insured that correlates to a risk factor but is unable to act on that information because of the regulatory environment, such as laws prohibiting adjustments to insurance rates based on gender, ethnicity, or preexisting conditions. The term *information asymmetry* is not strictly accurate in the second scenario but is still helpful if we imagine a less-informed doppelganger of the insurer who possesses only the information it can act upon and the difference that information asymmetry makes in its decisions.

Consider as well information asymmetry in contrast with "perfect information," the situation

Case Study: The 2008 Financial Crisis

At the end of the 1990s, a decade that began with a $100 billion expenditure by the federal government to remedy the savings and loan crisis and with a recession caused in part by the effects of that crisis on the finance and real estate industries, legislators dismantled the Glass-Steagall Act, which had been passed in 1933 to regulate the finance industry in order to prevent another Great Depression. The flurry of previously disallowed mergers of banks, brokerages, insurance companies, and mortgage companies that followed was one significant complication to the industry and to the investment market. Another was the increased prominence of computers and mathematicians in the industry. The former, coupled with software, trading Web sites that increased access to the markets, and electronic exchanges, led to the spread of high-speed trading. The former designed ever more complicated financial instruments, many of which were intended to eliminate the risk of high-risk loans by bundling them with lower-risk loans.

Investments always carry a risk, and investors understand this. What they understand less perfectly are the magnitude of that risk and the probability of loss. Some investors are especially risk averse, either because of personal preference or because of a requirement placed on their investment behavior: The managers of hedge funds, pension funds, and the investment portfolios of institutions like schools and charities, for instance, are supposed to engage in low-risk investing, in some cases accepting gains not much greater than the offset of inflation in return for protection against significant loss. Risky investments are supposed to carry a risk premium in order to be worthwhile—the expected return of a risky investment must be greater than the known return of a risk-free investment (such as a certificate of deposit, government bond, etc.). The greater the risk, the greater the difference in expected return should be—a principle called the "pricing of risk." Just as an insurance company needs to have an adequate understanding of the risk factors faced by a prospective customer to be insured in order to set its premium, so must an investor understand the risk in order to calibrate investing strategies to his/her acceptable levels of risk and prospective return. This is perhaps especially true in the case of the aforementioned hedge funds and other funds, where the purpose of their investment portfolio is to "hedge their bets," reducing risk exposure through diversification—an investment strategy that is highly sensitive to the quality of the investor's information.

It is an understatement to say that an information asymmetry existed with collateralized debt obligations and other new or newly popular derivatives. Many of the "quants," highly specialized mathematicians and physicists hired by the finance industry to structure these derivatives, didn't understand them as fully as they thought, as hindsight eventually made clear; those outside that elite had an even less sure grasp, and most investors impacted by these new derivatives understood no more than the fundamentals. Mortgaged-backed securities and collateralized debt obligations were subject to pricing models entirely out of sync with the actual risks underlying them. On top of that, the housing market of the 2000s was widely misunderstood. In retrospect, it seems obvious that the housing bubble would inevitably burst, that speculation in the form of "house flipping" artificially drove up prices, and that predatory lending practices and the growth of subprime mortgages increased banks' risk exposure, essentially generating risk and selling it off as an investment, but as late as 2007 commentators predicting such a collapse were dismissed or ridiculed.

The deregulation of the finance industry and the resulting mergers created a situation in which there was insufficient transparency about bank behavior and the risks engaged in by financial institutions. This would be true even if it were not also true, as later investigations found, that there were numerous cases in which financial institutions themselves did not adequately understand the risk they engaged in, and other cases in which risk was deliberately concealed or misrepresented. The asymmetry of information led investors to take on larger risks than they intended to take on, and

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when some of those risks were realized, financial institutions began to fail, leading to government bailouts on a much greater scale than the cost of remedying the savings and loan crisis two decades earlier. Those bailouts, though they have their critics, represented a basic principle in public policy: that some financial institutions are "too big to fail." While opponents of the Troubled Asset Relief Program (TARP) and other bailouts saw in those expenditures an unfair reward paid to institutions that had engaged in morally hazardous behavior, the proponents of the program, including the sitting president and both presidential candidates, saw it as a hedge against a much greater risk: the collapse of significant portions of the American financial industry and the effects that would have on the economy, currency, and availability of credit. It is worth remembering, of course, that the term *too big to fail* was coined in 1984—a time when, although deregulation was favored by many politicians, the financial industry was nevertheless much more heavily regulated than it was 24 years later. Regulation is a protection against moral hazard: the tendency, when an entity is shielded from risk by the promise of remedy, to engage in riskier behavior than would be considered without that safety net. It is for that reason that many legislators and consumer protection advocates called for greater regulation of the finance industry—a return to Glass-Steagall, as a minimum—in order to reduce future risks and contain the present crisis.

assumed in many game theory models in which behavior is predicted based on the assumptions that all agents make rational choices and have access to the same information to inform those choices. In contrast with perfect-information situations, in situations of information asymmetry, the rationality of agents is constrained by the information they have access to, or the effects of misinformation—an idea economists and other social scientists call "bounded rationality." Work on information asymmetry began roughly in the 1960s and 1970s in papers by economists George Akerlof, Michael Spence, and Joseph E. Stiglitz, who were awarded the Nobel Prize in Economics in 2001 for their contributions.

The insurance example above represents a case of *adverse selection*, or *negative selection*, a risk management term that originated in discussions of information asymmetry in the insurance industry but has since been applied to many other contexts. Akerlof's landmark 1970 paper "The Market for Lemons: Quality Uncertainty and the Market Mechanism," for instance, discusses adverse selection in the used car market. Used cars are referred to as cherries (high-quality cars) and lemons (low-quality cars). Although there may be a motive to sell a cherry if it has become a classic car that has appreciated rather than depreciated in value, Akerlof's analysis finds that owners of lemons are more motivated to place their cars on the used car market, and the bad thus drive out the good. Because many of the elements making up a car's quality are not discoverable by inspection—and need not be intentionally hidden to remain invisible—the buyer of a car has limited information about the quality of the car, especially compared to the previous driver, whose knowledge is deep and experiential. The car may even have lemon elements that the previous driver does not consciously consider, having absorbed compensatory behaviors as part of his driving habits—he knows without thinking about it that the handle of the passenger-side front door sticks, that the car needs to be braked gradually in the rain, or that it stalls on winter mornings if it isn't run for a while before backing out of a parking space. Discrepancies in the two drivers' driving habits and styles may make other factors invisible, such as if one driver does more highway driving or is used to turning more sharply or goes on long road trips.

The net effect of these asymmetries, Akerlof demonstrated, is this: because asymmetries of information exist, sellers are financially motivated to pass off goods as higher quality than they are. Because buyers are aware of this—being knowledgeable about the market at large, despite lacking knowledge of the product involved in the specific transaction—they assume the quality of the goods is uncertain and treat products as average or worse. This works to drive high-quality goods out of the market because the seller will have too much difficulty getting a fair price for them. Similar lemon markets exist in markets for used computers and other equipment, and the housing market is affected by similar factors, especially in the case of rentals, where the renter may not be motivated to make a thorough inquiry into quality because of his or her low time and financial commitment. Problems with a rented apartment may thus not become apparent until it has been lived in for a time, especially when problems are season-specific. The hiring process in a workplace and the admissions process in a college or graduate school are similar situations in which there is an asymmetry in the information possessed by each party about the candidate's qualifications. Even dating can be construed as a situation of information asymmetries, the remedy for which is the raison d'être of matchmaking services like eHarmony. In other situations, the asymmetries may result in the market simply failing to exist—an example Akerlof gives is that of the credit market in many developing countries, although since his paper was written, microfinance initiatives have been adopted in some parts of the world. Now one of the most-cited papers in modern economics, "Market for Lemons" actually faced considerable difficulty getting published—one journal rejected Akerlof for making his case too extreme, while others rejected the paper as, on the contrary, too trivial.

Because a federal consumer protection "lemon law" was adopted five years after the publication of "The Market for Lemons," proposed laws offering similar consumer protection against information asymmetry are sometimes called "a lemon law for the such-and-such market." One possible protection against adverse selection, against making the wrong choice, is the same in all cases: reduce information asymmetry by increasing information access. For insurers, this means detailed questionnaires and accurate information about risk factors, to the extent the law allows; for car buyers, this means as thorough an inspection as possible, and a cottage industry providing vehicle history reports to interested customers. Stiglitz and Spence proposed more specific solutions. Stiglitz introduced the idea of screening, in which the least-informed party provides inducements for the other party to reveal the information. Spence described signaling, in which parties adopt choices or behaviors that have the benefit of signaling the authenticity of their claims, so that the less-informed party will trust them: graduating from college, for instance, signals a claim about the graduate's capacity for skilled work, or work in a specific area.

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See Also: Bankruptcy, Corporate; Blame, Politics of; Bounded Rationality; Fraud; Insurance; Legal Liability; Reinsurance.

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Information Vacuums

Crises precipitate an increase in demand for information and present complex information environments. Gathering, organizing, and disseminating information to those who need it are

Case Study: Information Vacuum During the 2001 United Kingdom Foot-and-Mouth Crisis

The 2001 foot-and-mouth disease (FMD) outbreak in the United Kingdom (UK) constituted the biggest crisis ever to affect the UK farming system; it was one of the worst epidemics of its kind in the world, with 6 million animals being slaughtered. The crisis unfolded as a series of information and communication problems, primarily from the government to farmers, with consequences for action in a time of crisis. A study of the Cumbrian farming community explored the multiple informational needs that it faced during the crisis and examined the factors that created an information vacuum. Three key factors emerged.

Changes in Information Needs at Different Stages

Information was required at the different stages of the crisis. At the beginning of the crisis, farmers were desperate to know about the origin of the disease, identifying the disease, finding out where the disease was spreading and whose farms had been infected, information on eradication including the slaughter and disposal of animals, and information about cleansing of farms. Second, information was required on the complex system of biosecurity measures introduced by the government.

Context of Information Seeking

It is important to recognize the sociocultural and political contexts in which farmers were seeking information and how these contributed to information vacuums. Farmers live in close-knit communities and are very much an oral community where information is passed by word of mouth. Information is acquired from family, immediate farming neighbors, and farmers who often live in the same valley. In the sociocultural context, farmers were physically isolated, their daily routines disrupted, unable to exchange information, gossips and "crack" in their usual meeting places. Their normal channels of communication were disrupted from one that was primarily face to face to one in which technologies were the main methods of communication. Normally, farmers know where to go for their information: they exchange information at auction-marts, at farmers' discussion groups, in the pub, and in meeting each other during their work. In the crisis, this changed; they were seeking information in an environment where many diverse actors, networks, and agencies were responding to the crisis.

In a political context, farmers were seeking information in an environment where government disease control measures were complex: policies and strategies were continuously being adjusted to deal with the emerging situation, and legal requirements and implementation on the ground were subject to continual change in order to address problems as they developed. Farmers' information seeking was hindered by the government response, one that was severely criticized for shortcomings in the information gathering and processing and methods of communication. Information from the government was often not forthcoming, was not delivered at the "right" time nor at the "right" place, and was often contradictory.

Identifying Trusted Information Sources

The need for trusted sources of information contributed to information vacuums. In a crisis, trusted information takes on greater significance. Decisions have to be made about which sources of information and which information providers to trust. These decisions were critical because by acting upon trusted information, farmers could shape and influence the nature of the crisis. As distrust of the government intensified, an existing trust divide between farmers and the government intensified. Generally, farmers trusted anyone who had a local connection (except local government) and with whom they were familiar. Further, during a crisis, individuals must deal with information overload, from official and multiple unofficial sources. This increases uncertainty and the difficulty of making decisions about who and what are trustworthy sources of information. Farmers distrusted much of the information that reached them, and this lack of trust led to people making up stories, rumors, and gossip. Consequently, much of the information that farmers were seeking and receiving was second- and third-hand.

critical in the management of a crisis. Information is needed in crisis response and recovery by the many diverse actors, networks, and agencies involved in a crisis: officials, victims, members of the public, and the media. Government and nongovernmental officials need information to be able to respond to a crisis, victims need information to know where to go for support, the public needs information about what is happening, and the media need information to broadcast news about the crisis. Crises can present information overload; conversely, there is often a lack of information, often referred to as an "information vacuum." Operating in an information vacuum may exacerbate and increase the severity of a crisis.

Factors that contribute to an information vacuum include the lack of integration and coordination of information by various actors and agencies, the need to connect informal and formal channels of information, the changing information needs at different stages of a crisis, the uncertainty in crises that often creates conflicting information, and identifying trustworthy sources of information. In the absence of information from a credible source—for example a government agency—people look to traditional (e.g., television, radio) and new media (social media) for information.

Social media have become an important platform to disseminate information in crises. Recent global disasters have clearly demonstrated the power of social media to communicate critical information. Web 2.0 technologies enable the spread of information at great speed and to a wide audience. Often, information concerning a crisis is available on social networking spaces such as Facebook, Twitter, MySpace, and Bebo within minutes of its occurring. These tools increasingly have the capacity and power to inform, to misinform, and to identify an information vacuum, and consequently have the potential to create panic in communities.

In political disruptions such as the Arab Spring, government bans on media and self-censorship within mainstream media created information vacuums. Social media tools allowed citizens to mobilize and spread their messages where governments suppressed the free flow of information. With the advent of social media, bloggers fill and attempt to fill information vacuums.

Information vacuums induce rumor and gossip. When individuals lack information, they begin to seek it in rumors and gossip, which are virulent during crises. In normal circumstances, it is difficult to ignore gossip, but in a crisis situation where people are desperately trying to understand what is happening and seeking explanations, it is even more difficult. Often, people try to create a narrative to fill an information vacuum and a knowledge gap. A lot of time is spent trying to interpret and make sense of stories and trying to decide whether information is trustworthy.

Crisis response requires getting the "right" information to the "right" person at the "right" time. It is important in a crisis to communicate well; effective communication by all the actors can help diminish an information vacuum. An example of a massive information vacuum was reported in eastern Liberia in 2011 by Internews, a nongovernmental organization (NGO) working to improve information exchange in disasters. Internews reported that thousands of refugees wanted to know what had happened to their family members, what was the state of their villages, and whether it was safe to go home.

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See Also: Crisis Communications; Crisis Information Management Systems; Emergency Public Information; Mass Media; News Media; Social Media.

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Insurance

Insurance is a well-known risk transfer instrument that aims to reduce the financial uncertainty of risks that are confronted by individuals, institutions, or business entities and to protect them against loss of capital. To serve its aim, insurance creates an "economic system" in which financial loss risk is transferred from insureds to insurer through periodic payments, that is, premiums. If losses occur, the insurer pays the claims of insureds through compensation. That is, insurance provides financial aid to individuals and business entities to keep them intact in case of individually (e.g., traffic and work accidents, health, illness) or collectively confronted crises (e.g., economic, environmental such as natural hazards and climate change, and political such as terrorism). Hence, both forms of modern insurance (i.e., "private" and "social") have significant roles in crisis management, from recovery to risk reduction.

Private insurance, which is offered by insurance companies as a commercial commodity, is purchased by individuals voluntarily in the market. Private insurance can be traced back to ancient China, Babylon, and Greece, when it was used to compensate the losses of traders and ship owners. It is known that marine insurance was used during the Mediterranean trade of the 14th century. In the 17th century, fire insurance in London and the Lloyd's Coffee House in England were the milestones of modern insurance. In the 18th and 19th centuries, new security needs emerged, depending on geographical discoveries, trading, capital accumulation, the Industrial Revolution, and urbanization, when the development of probabilistic and statistical sciences improved calculation of risk and caused the development of modern insurance technology. Simultaneously, the first social insurance programs emerged in Germany.

Social insurance provides security systems for health, work-related events, accidents, injuries, illnesses and death, and old age, when participation usually becomes compulsory. In the 20th century, social insurance was accepted as a condition and task of citizenship, particularly in the welfare states after 1945. Today, the liberal and neoliberal economies have worked to replace the role of the social state with the private sector. Nevertheless, many areas including western Europe and the United States have social insurance programs for many risks involving health, agriculture, and floods, and many countries implement compulsory insurance for fire, employer liability, motor vehicles, and environmental pollution.

It is the "insurance technology" that brings all social, economic, and political differences under the name of insurance. This technology is based on statistical and actuarial principles such as risk prediction, probability, classification, the law of large numbers, and pooling. These techniques make insurance a social device in which affordable premiums can be offered even for large financial losses; the losses of few are paid by many, uncertainty is reduced, and losses are shared in society. In turn, losses can be compensated by applying the assets of other insureds, who have not confronted a loss yet. Serving the collective well-being through large pools provides social solidarity. Besides, insurance has the potential to promote risk reduction through education campaigns, risk awareness programs, and contractual methods such as coinsurance, deductibles, and premium reductions.

The Role of Insurance in Crisis Management

Depending on these attributes, insurance has many advantages and significant roles in crisis management that can range from recovery to risk reduction. First, insurance has the potential to replace relief programs of states during recovery, because insurance lessens the burden not only of citizens and/or insureds but also that of states. Although the state can compose ad hoc financial resources for extreme cases or constitute regular resources through disaster funds, state aid can prevent risk reduction activities, increase risky activities, and create reluctance for self-insurance. Moreover, because of the rare occurrence of crises, states usually transfer the accumulation of contingency funds to other expenses. Thus, the scarcity of resources in case of crises leads them to reallocate their resources intended for development and to introduce additional taxes and to borrow from international donors.

In recent years, the increasing demand on international donors, particularly by developing nations, has limited the availability of these funds and caused delay of states' development. Thus, the emerging international disaster policy of the

Bonnie Cleveland helps clean out a friend's home in Cedar Rapids, Iowa, on June 17, 2008, after the Cedar River flooded. Most private insurers do not offer coverage for the peril of flood, and only 20 percent of at-risk U.S. homes purchase federal flood insurance. States may then have to compensate uninsured people in the event of a catastrophic flood, which increases state-aid expectations and further diminishes insurance demand, generating a self-perpetuating cycle.

United Nations since the 1990s (e.g., UNISDR, Yokohama Strategy, Kobe Conference, and Hyogo Framework for Action) has recommended that countries all over the world develop risk financing instruments with the purpose of balancing risk reduction and loss compensation. Because it is a common risk transfer tool in the developed nations, use of insurance and its integration into risk reduction activities (e.g., building codes and land use regulations) is strongly suggested to other nations, with particular consideration of the protection of low-income households.

However, insuring catastrophic events (e.g., terrorism, war, fire, and natural disasters such as hurricane, flood, windstorms, and earthquake) can be difficult in market conditions. In addition to a lack of necessary knowledge about these risks, information asymmetry problems (i.e., adverse selection and moral hazard) can reduce the calculability of such risks by insurance techniques. "Adverse selection" is described as the tendency of people at high risk to insure themselves more than other people at low risk, and "moral hazard" refers to the lack of incentive or willingness for risk prevention and can rise to amplify risks and the probability of loss. As a consequence of information asymmetry problems, accumulation of high risks in the insurance pool may result in catastrophic losses. Moreover, the geographical focus and spatial dependency of these risks can also cause catastrophic losses, so that financial difficulties for indemnification can result in insolvency.

Indeed, catastrophic loss depends on the insurers' capacity to absorb losses. Thus, insurers usually insure such kinds of uninsurable risks by applying certain techniques. For instance, insurance companies can increase their capacity in terms of transferring their risks into international capital markets through reinsurance. Moreover, risk classification and pooling can make it easier to estimate potential losses through special techniques, such as probable maximum loss. Other techniques can include increasing the variety of risks in the portfolio, diversification of risks into a broader geographical area, selection of good risks (low, similar, and independent), exclusion of bad risks (incalculable and dependent) through risk classification, and encouraging risk mitigation through risk-based premiums.

In recent years, however, the insurance industry has confronted catastrophic losses from natural disasters even in the developed nations. Thus, some insurers withdrew from flood and earthquake insurance in certain areas such as California and Florida in the 1990s, when others implemented high risk premiums. However, decreasing demand for insurance has shown that states may have to compensate losses of uninsured people after catastrophes, which in turn can expand the state-aid expectation and diminish insurance demand. Likewise, the September 11, 2001, terrorist attack in the United States has also brought about the discussion of the uninsurability of terrorism risk.

Nevertheless, the industry continues to insure natural hazard and terrorism risks through new techniques and innovations. For example, the catastrophic losses in the United States during the 1990s led reinsurance prices in global markets to rise and resulted in the emergence of alternative risk transfer (ART) instruments such as catastrophic bonds, swaps, derivatives, and contingent credits. Another trend in the industry is observed to be increasing concern to promote natural hazard risk mitigation for households (e.g., the Institute for Business and Home Safety [IBHS] in the United States). Moreover, the insurance industry has made efforts to improve risk information through risk maps. When some reinsurance companies develop risk maps for several countries (e.g., CatNet of Swiss Re, NatHan of Munich Re), some countries are observed as establishing public-private partnerships (e.g., HORA in Austria, ZURS in Germany).

In addition, some developed nations (e.g., Switzerland, Spain, the United States, Iceland, Norway, France, Japan, and New Zealand) have established catastrophic insurance pools (CIPs) as public-private partnerships. These CIPs aim to increase the availability of hazard insurance and lessen the burden of governments. Although most of them are based on the solidarity principle and operate as social insurance programs, lack of risk-based premiums prevents encouragement of risk reduction. However, the National Flood Insurance Program provides incentives to local governments for identification, assessment, and reduction of flood risk (e.g., the Hawaii Hurricane Catastrophe Fund contributes to a risk mitigation fund and implements premium reduction).

However, the developing nations have further difficulties in implementing natural hazard insurance, particularly in market conditions, because of high incalculability of risks, low capacity of insurers, and lack of insurance culture. Hence, the international donors support the establishment of CIPs as public-private partnerships, both at the national level (e.g., the Turkish Catastrophe Insurance Pool) and the regional level (e.g., the Caribbean Catastrophe Risk Insurance Facility). Moreover, microinsurance, which is offered by insurance companies and nongovernmental organizations, can provide protection for rural households and small businesses in the least developed countries.

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See Also: Emergency Management, Principles of; Information Asymmetry; NatCatSERVICE (Munich Re); Recovery; Reinsurance; Residual Risk; Risk Analysis; Risk Assessment; Sigma (Swiss Re).

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Interdependence

Complex, *interconnected*, and *interdependent* have become definitive terms reflecting the reality of the dependence of modern lifestyles on the infrastructure that sustain them. The global economy is increasingly dependent on interconnected networks of infrastructures that are spread across multiple temporal and spatial scales and serve as the critical lifelines to the functioning of modern society. Interdependence in the simplest definition is understood as a condition of mutual dependency. The concept of interdependence can be applied to an organization, a community, infrastructure, nation-states, or the global financial system. Interdependent organizations, infrastructures, or nation-states are those where the function of one entity is dependent on and influenced by the other entity. This interdependence provides new avenues of increasing vulnerability, where increases in the complexity and tight coupling of critical infrastructures and economic and social systems allow relatively small disturbances to rapidly escalate into compound crises. This article focuses on infrastructure interdependence given the critical importance of functioning for crisis management.

Just-in-time supply chains, reliance on electronic systems, planning and development patterns that promote the physical collocation of infrastructure/utility corridors, aging infrastructure and increasing congestion, the increasing intensity and incidence of severe weather events, and potential cyber/terrorism attacks are among many factors cited for increasing interdependencies. Disruptions in one infrastructure can cascade, affecting dependent infrastructure sectors. Failures in these sectors feed back into the initially impacted sector, transcending through the public and private companies, impacting essential services with far-reaching health and human safety, societal, economic, environmental, and national security consequences.

For example, the dependence of water and wastewater infrastructure on electricity for pumping and for operation of treatment facilities, control systems, and monitoring systems is obvious to most users of these systems. Water and wastewater systems are also dependent on repair and maintenance personnel, who are reliant on transportation, which is reliant on a continuous supply of fuel. The sector is also reliant on communications for ordering supplies and equipment and on financial systems to support billing, payments, and other business services. Similarly, the electricity industry depends on fuel supply, road and rail transportation to deliver fuel to the generators, water for cooling and to reduce emissions, and telecommunications to monitor system status and system control. Acknowledging and addressing these interdependencies is an important task for infrastructure planners and operators as part of risk and crisis management strategies at the planning, response, and recovery stages.

Understanding the nature and the types of interdependencies is the first important step toward this task. Stephen Rinaldi, James Peerenboom, and colleagues, in their seminal work, defined four types of infrastructure interdependencies: physical (e.g., the material output of one infrastructure is used by another), cyber (e.g., infrastructures utilize electronic information and control systems), geographic (located in close spatial proximity), and logical (e.g., infrastructures are linked through financial markets). Infrastructure interdependencies vary significantly in scale and complexity, ranging from local linkages (e.g., municipal water supply systems and local emergency services), to regional linkages (e.g., electric power [British Columbia Hydro]), to national linkages (e.g., interstate transportation systems), to international linkages (e.g., telecommunications and banking and finance systems).

Case Study: The November 2006 Blackout in Europe

The November 2006 blackout event in Europe is considered one of the key references and a powerful case that contributes to the discussion on interdependence. As Steven Castle wrote for *The Independent*: "one of the worst and most dramatic power failures in three decades plunged millions of Europeans into darkness over the weekend, halting trains, trapping dozens in lifts" and prompting calls for reconfiguration of the governance structure by creating a central European power authority. The blackout impacted other critical infrastructure services (such as transportation) that were dependent on power provision.

Unlike the 1998 Ice Storm Blackout in northeastern North America, this event was not caused by a severe weather event but was the result of an overload triggered by the disconnection of a line in the north-German grid and further poor coordination between the system operators. The cascading outages split the European interconnected network into three separate areas with significant power imbalances. The power imbalance in one of the areas induced a severe frequency drop that caused an interruption of supply for more than 15 million European households.

The impact of this blackout ranged from minutes to hours. Full resynchronization of the system was completed 38 minutes after the splitting, and a normal situation in all European countries was reestablished in less than two hours.

The success of the restoration was credited to the adequate performance of automatic countermeasures in each individual Transmission System Operator control area and additional manual actions by operators a few minutes after the splitting. The decentralized nature of the responsibilities of the Transmission System Operators demonstrated their efficiency in managing the consequences of the direction and preventing larger crisis.

This serves as an illustration of the influence of the increased level of interconnectedness and interdependency of infrastructures, where a small disturbance can lead to a large-scale impact because of cascading effects. It speaks to the importance of policies and strategies to address interdependencies beyond the national boundaries.

Methodologies to Map Interdependencies

Several methodologies can be used to map interdependencies that can be qualitative and quantitative in nature. For example, the Swedish Emergency Management Agency's model uses a qualitative dependency analysis approach to critical societal functions, using the "dependency wheel." In Finland, a linear mathematical model was developed to rank the risks involved in different societal functions provided by critical infrastructure sectors as a tool for informing national level planning. In Canada, Tyson Macaulay used a mixed model for creating a Canadian critical infrastructure interdependency wheel using quantitative econometric information about the value of goods and services flowing among Canadian critical infrastructure sectors and qualitative metrics "data dependency," which is derived from industry executives' opinions on the criticality of information and data flowing to and from their own companies and industry sectors. Another effective way—in terms of timing, costs, and data requirements—of assessing interdependencies is through intersectoral workshops designed around raising awareness of interdependencies by bringing relevant partners together. This method frequently uses risk scenarios for facilitating the discussion but does not require detailed modeling knowledge.

Acknowledging infrastructure interdependencies within planning can play an important role for building resilience and improving crisis management capacity. Understanding infrastructure interdependencies necessitates bringing together local public, private, and other stakeholders across the scales of governance to share information and address regional vulnerabilities and consequences under different scenarios. Among the most frequently cited difficulties for identifying and addressing interdependencies are a lack of common language among the sectors, an unwillingness to share critical information, the private sector is frequently unwilling to share information on interdependencies due to fear of enhanced regulation, and planners/disaster managers' lack of previous experience with actual disasters. Increasingly, the creation of partnerships is being seen as a solution to provide trusted forums to identify resilience needs and gaps and facilitate continual resilience improvements and crisis management capacity at the organizational and higher levels of governance.

Systematic and strategic assessment of interdependencies is increasingly emerging as a prominent issue in public policies around the world. In the United States, the 1997 President's Commission on Critical Infrastructure Protection stressed that "mutual dependence and interconnectedness made possible by the information and communications infrastructure lead to the possibility that our infrastructures may be vulnerable in ways they never have been before." In Canada, the government acknowledges that "interdependency analysis must be integrated into risk management decisions, mitigation and preparation strategies, and response and recovery." The recognition of the highly interdependent nature of critical infrastructure in Australia has initiated a cross-sectoral analysis of dependencies that will assist owners and operators of critical infrastructure and the Australian government to better understand systemwide risks that are beyond the purview of individual organizations, sectors, or jurisdictions.

The Critical Infrastructure Program for Modelling and Analysis (CIPMA) is a computer-based capability that uses a vast array of data and information from a range of sources (including the owners and operators of critical infrastructure) to model and simulate the behavior and dependency relationships of critical infrastructure systems. The capability includes a series of "impact models" to analyze the effects of a disruption to critical infrastructure services (flow-on effects of a critical infrastructure service disruption within and across sectors, impacts on economy and population, the duration of disruption, and how this affects the behavior of the various infrastructure systems as a result of the service interruption). In the European context, the Good Practices Manual for Critical Infrastructure Policies (RECIPE) provides an example of a similar system developed by the Swedish government tested under crisis. In the aftermath of the severe disruptions resulting from the ash cloud emitted from 2010 eruptions of Iceland's Eyjafjallajökull volcano that affected a major part of the European air traffic for weeks, the Swedish emergency management agency (MSB) used its VisuaMSB tool and dependency database to assess the consequences for infrastructure services on other sectors. The findings of the potential effects were communicated to all relevant sectors and were used for planning purposes. These initiatives highlight the importance of building and maintaining systematic knowledge about infrastructure dependencies that can be used as part of strategic risk and crisis management before, during, and after events.

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See Also: Cascading Crisis; Coping Capacity and Response Capability; Coupling; Critical Infrastructure; Resiliency.

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International Children's Fund, UN (UNICEF)

The United Nations Children's Fund was originally called the United Nations International Children's Emergency Fund, from which its popular acronym UNICEF derives. It is one of the agencies within the United Nations that are of key significance regarding crisis management worldwide. UNICEF was formed during crisis, in the aftermath of World War II, to provide emergency food and health care to children.

UNICEF as an Organization

Although some United Nations (UN) agencies have been branded ineffective and bureaucratic at times, UNICEF has generally been regarded as highly effective at achieving its aim of improving child survival rates and enhancing the development of children worldwide. However, too often, success among the UN agencies has been closely associated with the executive directors who are in place at the time. In many respects, UNICEF has successfully maneuvered itself away from this situation right from its beginning, managing crisis after crisis facing children and women in many parts of the world. Since its formation in 1948, the agency has been extremely proactive, adjusting to emerging realities, strategic possibilities, and challenges and in the process, becoming very effective in managing crisis.

Specific factors are critical to effective crisis management for any organization, including compliance with regulations or the law, the level of preparedness within an organization, and the nature and quality of planning that an organization has undertaken. Other factors include availability of training and resource development activities to counter disaster threats, the infrastructure for information management, and communication, upon which the systems are enabled for effective decision making. In addition, the quality of interaction with other key actors to enable the organization to deal with complexity, and an effective yet flexible crisis management model, also play significant roles in the effectiveness of crisis management.

Specifically in the context of UNICEF's crisis management approach, these factors can be discussed within the following broad themes: compliance, preparedness, training and development to be responsive and capable to managing crisis, and generating and managing relevant information.

Compliance

UNICEF's development and promotion of compliance worldwide to international conventions, standards, regulations, and codes of practice demonstrates the agency's awareness of critical issues in crisis management. Adoption of certain legal obligations by being a signatory to or adhering to international conventions, for example, is likely to influence national law and policy. Compliance with international conventions by a state may result in addressing vulnerabilities within the processes of preventing and managing crisis. Since its founding, UNICEF has worked closely with the UN Human Rights Group, which drafted the Convention of Rights of the Child. The agency was critical in facilitating input from nongovernmental organizations, but more important, it influenced the inclusion of "survival and development rights in addition to protection rights" for children. Governments of the world later codified a set of legal obligations toward children in the form of the International Convention on the Rights of the Child.

Further, in order to mitigate against crises affecting children, and concerned with the decline in breastfeeding, in 1981 UNICEF and the World Health Organization (WHO) sponsored the International Code of Marketing of Breastfeeding Substitute. At the international level, this code underlined the critical role of breastfeeding, which had been losing ground as a result of marketing pressures by formula companies. Such strategic planning was critical in averting critical crisis situations caused by dramatic incidences of malnutrition in children worldwide, thus preventing the need for supplements of Ready-to-Use Therapeutic Foods (RUTF).

Since their founding, UNICEF and WHO have jointly and consistently used international forums to great effect in codifying and influencing national policy focused on child survival, development, and protection. Throughout the history of UNICEF, such child-friendly policies have resulted in effective crisis management for children at national and international levels.

Preparedness

Another key aspect of crisis management that UNICEF has been effective at pursuing is preparedness for crisis management. In about 1987, as most sub-Saharan African countries were faced with serious economic crisis resulting from debt obligations to both the International Monetary Fund and World Bank adjustment programs, UNICEF called for "adjustment with a human face." This advocacy initiative was geared toward averting widespread drastic declines in education, health, and social services under the adjustment program. Similarly, having observed that many sub-Saharan countries were facing imminent problems in funding, UNICEF tried with some success to implement the Bamako Initiative, whereby health fees paid by users were in some cases injected into the health system to minimize strains on health services at the community level. However, this was met with fierce opposition in certain quarters.

One of the qualities of effective crisis planners is their ability to discern that some areas will not always follow a predetermined trajectory. Despite well-rehearsed and documented institutional and scenario planning, the agility of such plans in response to an actual crisis is critical. Having learned that crisis management can sometimes be a "fuzzy art and science," UNICEF and other partners played a critical role in establishing an emergency supply center in Copenhagen, Denmark. A range of essential supplies, including emergency health kits, children's recreation kits, basic family water kits, and School-in-a-Box kits for emergencies can be obtained from UNICEF's supply warehouse in Copenhagen. Of particular importance relating to the Copenhagen warehouse is the whole assortment of crisis-related supplies designed to cater to diverse and unforeseen needs in emergency contexts. The school kits, for example, are designed to meet the immediate and urgent needs of both teachers and children after disasters.

Training and Development

Crisis management also involves the ability to anticipate what might go wrong; scanning the organization's horizon for what is likely to happen constitutes good practice. Although there is an inherent assumption that crises are unexpected, there are precautions that create a starting point for decision making and checking processes relating to interrelationships for action when a crisis occurs. UNICEF has consistently undertaken initiatives to develop field and local structures that enhance delivery of services in both prevention and crisis situations.

Like other UN organizations, UNICEF was more vertical in its strategy and operation when it was founded. This meant focusing on providing technical assistance and targeting specific diseases such as malaria or tuberculosis. Although this approach has its strengths, UNICEF as a learning organization adopted a visible horizontal strategy for its operations in the 1970s, empowering and developing systems at the ground level, which has resulted in crisis-resilient communities and local agencies.

Information Management

Information systems and processes are very critical in crisis management situations. Real-time information and intelligence can help decision-making processes and outcomes and shape the direction of events in a crisis situation. Robust information-flow mechanisms will be designed to capture unexpected, negative surprises that threaten normal functioning of an institution, an organization, projects, or an image. For instance, UNICEF has been particularly proactive in designing frameworks and harnessing strategic opportunities by establishing the UNICEF International Child Development Centre (later known by the name of Innocenti Research Centre) in Florence, Italy. The establishment of this center was closely aligned to UNICEF's commitment to appreciate and promote "the interrelated needs of the whole child," and information is generated through the Innocent Centre to assist and inform decision making. An organization designed with effective mechanisms to capture intelligence is a hallmark of effective crisis management.

Conclusion

Effective crisis management involves planning and examining processes and relations that exist at different levels. This process cannot be smooth unless relevant information, means of communication, and structures for decision making are clear to everyone involved. In the final analysis, crisis management is the art and science of dealing with disruptions that can sometimes be discordant with neatly choreographed planning associated with how and where we think catastrophes manifest themselves.

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See Also: Bureau for Crisis Prevention and Recovery, UN (UNDP–BCPR); International Strategy for Disaster Reduction, UN (UNISDR); Interregional Crime and Justice Research Institute, UN (UNICRI); Office for the Coordination of Humanitarian Affairs (OCHA), UN; Poverty; Public Health Surveillance; Refugees and Forced Migration; World Health Organization (WHO), UN.

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International Organization for Standardization (ISO) 31000

ISO 31000 is a collection of risk management standards compiled by the International Organization for Standardization. ISO 31000 is not a certification system or a standard. Published as the *ISO 31000:2009, Risk Management—Principles and Guidelines*, the guidelines are designed to be used by any individual or group, public or private. The guidelines were published with the *ISO Guide 73:2009, Risk Management—Vocabulary,* and both were released in conjunction with the ISO and International Electrotechnical Commission (IEC)'s *ISO/IEC 31010:2009, Risk Management—Risk Assessment Techniques*.

ISO 31000 helps the user design, put into effect, and use different risk management systems to manage both risk and uncertainty. It is designed to help organizations in many different ways, including objective identification, risk awareness, regulatory requirement compliance, resource allocation, loss prevention, improved resiliency, and, ultimately, risk management. It includes 11 key principles that can be broadly applied to different situations. Although generic components of ISO 31000 can be applied to each of these groups or to individuals, their specific implementation can be adjusted as needed. ISO 31000 acts as a replacement for other risk management approaches, such as the Australian/New Zealand Standard (AS/NZS 4360:2004).

Risks and Risk Management

Precise definitions of risk used in academic, business, nonprofit, and government circles vary widely. However, ISO 31000 defines risk as the effect of uncertainty on objectives, including the positive, the negative, the simply unexpected, or even more uncertainty. To determine which specific risks an organization faces, the group must determine what its objectives are, as well as the potential risks to those objectives.

Successful risk management must include the assessment and subsequent management of risks that exist throughout an organization or group. Risk management has the potential not only to help groups minimize the potential impact of crises but also to promote better day-to-day organization and functions. Within the ISO 31000 guidelines, risk management includes a variety of approaches to risk, such as the transformation of management policy, consultations about risks and risk management, and not only assessing risks but also monitoring them over time. Ultimately, risk management, per ISO 31000, is made up of activities (coordinated within an organization) that control the organization's approach to risk, such as communication, consultation, contextualizing, assessing, and monitoring a variety of risks.

Given the element of uncertainty in an approach like ISO 31000, to determine these risks, organizations must look at the objectives in a variety of ways and consider a range of potential effects other elements, including crises, might have on them. This risk assessment is the first critical step toward well-organized and successful risk management. Once determined, risks need to be described in as much detail as possible, delineating not only the risk itself (for example, its size) but also who or what may be affected by it. In doing so, organizations can begin to better form a plan to manage and perhaps mitigate risks and, in turn, take steps toward crisis management as needed.

Use of ISO 31000

ISO 31000 includes two key components: (1) a framework and (2) a process. The framework is made up of the guidelines needed to form the structure and operation of risk management in a group. This framework includes the creation of policies, implementation of those policies, and the long-term monitoring and review of those policies and the risks they are designed to manage. The process, in contrast, is the actions needed to identify, assess, and manage risks. It includes communication about the actions being taken, execution of policies put into place under the framework, and regular and long-term monitoring and review of risks and risk management.

ISO 31000's guidelines designed to encourage feedback about both risks and risk management include (1) monitoring and review and (2) consultation and communication. Each of these components is important because they enable a group to keep track of identified risks and potentially to spot emerging or previously unidentified risks quickly. They also allow groups to track risks and risk management efforts, communicate those risks and efforts, as needed, to other individuals or groups that can assist with risk management, and create an environment that encourages consultation between different parties to ensure knowledge and resources are best used to assess and manage risks. All of these steps are critical not only for daily risk management efforts but also for the necessary management of risks that emerge in moments of crisis.

ISO 31000 has already been adopted by many organizations, groups, and businesses around the world. Although it is not intended to be an identical approach in all situations and is not a standardized certification system, the guidelines and related vocabulary do offer some commonalities and standards globally. This agreed-upon use of terms, definitions, and basic approaches is beneficial to users because it facilitates cooperation and understanding between different groups, particularly in moments of crisis when joint management may be helpful or even necessary.

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See Also: Disaster Risk Reduction; Hazard Mitigation; High Reliability Organization Theory; Incident Management; Risk Assessment.

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International Strategy for Disaster Reduction, UN (UNISDR)

The United Nations International Strategy for Disaster Reduction (UNISDR) is a secretariat of the United Nations that focuses on disaster risk reduction as a form of crisis mitigation. This brief introduction discusses the founding and contemporary characteristics of the organization, its governing philosophy, and its risk reduction practices.

Initiated in 1999, the UNISDR was founded in 1999 as a successor secretariat of the International Decade for Natural Disaster Reduction (1990–2000). Its mandate is to serve as the hub of and synergize activities by the United Nations as they relate to disaster reduction. The secretariat is composed of 90 employees based in five regional offices (Kenya, Panama, Egypt, Thailand, and Belgium) with headquarters in Geneva, Switzerland. In 2010, the budget for the organization was about $25 million, all of which was funded by volunteer contributions from nations and institutions (the largest donations were from Sweden and the World Bank). Unlike many other nongovernmental organizations (NGOs) described here, the UNISDR works to coordinate and provide useful information to various actors, from emergency responders to nation-states.

Governing Philosophy and Practices

The focus of UNISDR as an international nongovernmental organization is to work in disaster risk reduction (DRR), especially as it relates to climate change adaptation, building disaster-resilient cities and infrastructure, and strengthening the international disaster management system. As described on its Web site, the organization also promotes the three goals set forth in the Hyogo Framework: “integrating DRR into sustainable development policies and planning, developing and strengthening institutions, mechanisms and capacities to build resilience to hazards, and incorporating risk reduction approaches into emergency preparedness, response, and recovery programmes.”

The UNISDR does not work directly on crisis management but rather on the implementation of DRR strategies and compliance with the Hyogo Framework for Action 2005–2015 (HFA) endorsed by the General Assembly. The goal of the organization is to reduce substantial losses associated with disaster both in lives and in the social, economic, and environmental resources at local and national levels. To implement this goal, the organization has four major areas of action: coordination, campaigns, advocating, and information dissemination.

First, UNISDR coordinates a large network of organizations including states, intergovernmental and nongovernmental organizations, financial institutions, technical bodies, UN agencies, and civil society to implement regional and national platforms and to promote the HFA. Coordination means much more than networking. The UNISDR effectively builds relationships between various agents in order to avoid replication of services and to ensure that all needs are adequately addressed. In addition, the organization hosts the Global Platform every two years to bring various groups together to better understand and implement DRR strategies.

Second, the organization campaigns to highlight the benefits of DRR and to empower citizens to reduce vulnerability. Biannually, the UNISDR focuses on varying topics, including issues of human and natural vulnerability, youth and disaster prevention, and prevention investment by governments and organizations. The current campaign targets local city officials with the goal of creating resilient cities by addressing issues of local governance and urban risk.

Third, the UNISDR advocates increased investment in DRR. In particular, the organization highlights the interconnectivity of risk reduction and thereby necessitates a holistic strategy that addresses climate change adaptation, broadening education, promoting gender equity, and sustainable development.

Finally, the UNISDR provides tools and analysis of changing global disaster risk and supports the Hyogo Framework for Action (HFA) Monitor, which promotes nation-state implementation of HFA. The organization also has hundreds of documents, a robust Web site (http://www.preventionweb.net) that connects interested people with one another and with cutting-edge information, and thousands of educational resources. As a result of these actions and resources, UNISDR contributes to the achievement of the Millennium Development Goals by protecting vulnerable populations and creating greater stability for citizens and governments.

In sum, the UNISDR continues to influence how many institutions, governments, and organizations understand and deal with disaster mitigation and preparedness. As its motto, "connect and convince to reduce disaster impacts," illustrates, the United Nations organization has made a significant impact on how disaster reduction is understood in an increasingly hazard-filled world.

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See Also: Disaster Risk Reduction; Nongovernmental Organizations; Preparedness.

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Interoperability

Consisting as it does of 26 nations, the North Atlantic Treaty Organisation (NATO) can only be effective if the military organizations in each of these countries can come together and work toward common goals in joint operations. In this case, then, interoperability means the ability of different military organizations to conduct joint operations, something that NATO has worked toward since its inception in 1949.

Lack of Standardization and Compatibility

However, the complexity of recent high-impact crises such as 9/11 in the United States, the southeast Asian tsunami (2004), the suicide bombing of the London transport system (2005), Hurricane Katrina (2005), the Mumbai terrorist attack (2008), the Haiti earthquake (2010), floods in central Europe (2010), and the Japanese earthquake and tsunami (2011) has focused the need for the emergency services and other agencies to have an interoperable capability when responding to these types of crises in order to better safeguard the communities they serve. But the fragmented makeup of the various agencies involved has revealed a lack of standardization in relation to equipment and procedures across geographic and organizational boundaries that has made this very difficult. Therefore, in some quarters, interoperability in the civilian domain has come to mean the capability of organizations or parts of organizations to exchange operational information and to use it to inform decision making. But it is arguably wider than that. Crises and disasters do not respect national borders and often have cross-border consequences, for example, the southeast Asian tsunami and the central European floods;

alternatively, crises such as the Haiti earthquake attract response and recovery teams from many countries, each with their own equipment and procedures. Therefore, the aim of interoperability should be to have compatible processes and procedures in order to bring about a multiagency response that is both effective and efficient. Communities deserve no less.

Clear situational awareness is a key factor for the effectiveness of crises, disaster, and emergency operations It is based on the compilation of information collected from the different teams of responders, sometimes from different countries, speaking different languages. The building of situational awareness relies on the accurate and timely exchange of information in a manner that is understood by all. The aim of interoperability is to give all those who might respond to such events the ability to communicate in a common language across national, state, and local boundaries.

The report into 9/11 highlighted, among other things, the lack of interdepartmental compatibility in communications. The New York City's Office of Emergency Management (OEM), set up by former mayor Rudy Giuliani, was, as part of its function, intended to monitor emergency communications during a crisis, but on the fateful day it was unable to coordinate the activities

U.S. Navy machinist Joel Rivera of the Deep Submergence Unit descends a hatch during a submarine rescue exercise with the Russian submarine SSK Alrosa *in the Mediterranean Sea, June 7, 2011. Bold Monarch is a submarine rescue exercise sponsored by the North Atlantic Treaty Organization (NATO) that supports interoperability between all submarine rescue units. The 12-day exercise is held every three years and involves ships, submarines, and aircraft from both NATO and non-NATO countries, including Russia.*

of the multiple responders because the New York police and fire departments viewed themselves as autonomous. Also, the OEM Crisis Management Center was located within the World Trade Center complex and was destroyed when the buildings collapsed. Consequently, this inability to communicate across organizational boundaries clearly cost lives when police helicopters circling overhead predicted the collapse of the North Tower, a view that was not communicated to the fire department.

A report issued by the U.S. Conference of Mayors in June 2004 found that 80 percent of American cities did not have interoperable emergency communications. However, the Federal Emergency Management Agency (FEMA) stresses the importance of communications interoperability, pointing out that it enables emergency management and response personnel and their affiliated organizations to communicate within and across agencies and jurisdictions via voice, data, or video in real time, thus allowing for a continuous flow of critical information at a time when it is needed most. The National Incident Management System (NIMS) also outlines the requirement for interoperability and stresses that common communications and data standards are essential if NIMS is to be effective. It suggests that standards need to be set for a number of functions of data. These include incident notification, situation reports, analytical data, geospatial information, and wireless communications. The Homeland Security Act, 2002, as amended, mandated the creation of an overarching strategy to address current shortfalls in emergency communications in the United States. As a result, in 2008, the Department of Homeland Security issued the first National Emergency Communications Plan (NECP), which established clear goals for improving interoperability in the systems of the various response agencies. As a consequence of this and the criticisms that came, particularly after 9/11 and Hurricane Katrina, much has been done to improve interoperability. A report by the U.S. Senate Committee on Homeland Security and Government Affairs titled "Ten Years After 9/11: Improving Emergency Communications," issued in July 2011, reported a much improved situation across the United States in the ability of emergency response agencies to exchange data but stressed there was still much to be done.

Challenges in Europe

Europe has experienced a number of disruptive challenges, such as the floods in 2010 that affected eight countries and resulted in a further five countries coming to their assistance. The main challenges for Europe's emergency responders when dealing with such incidents have been language, technology, and physical barriers. Therefore, in 2004, a four-year program, OASIS (the Open Advanced System for dISaster and emergency management), funded by the European Union, was launched. Its purpose was to define and develop an information technology framework based on an open and flexible architecture and, using standards, both existing and proposed by OASIS, provide a basis for a European Disaster and Emergency Management System. In doing so, it was intended to facilitate cooperation between the information systems used by civil protection organizations throughout Europe.

According to a report by the Royal United Services Institute in the United Kingdom, "Interoperability in a Crisis," research into interoperability within the emergency response community in the past has tended to focus on the compatibility of technology and equipment. As a consequence, efforts to improve interoperability have been mainly focused on the ability of one response agency to be able to communicate with another using information and communication technology that is compatible, resilient, and secure. However, as the report points out, interoperability is not just about technology—it is also about people and processes. More recently, in 2011, the UK National Police Improvement Agency produced "Interoperability Guidance on Multi-Agency Interoperability." Annex A of the new CONTEST strategy document (the UK's counterterrorism strategy) lists 29 separate government departments and agencies on whose cooperation—or, in this case, interoperability—delivery of the strategy depends. Ensuring that they all operate to common standards, levels of training, equipment, and technology will not be easy because there are serious challenges in bringing about interoperability.

Technology Plus Willpower

Historically, the communication systems of the various response agencies have been hampered by incompatible radio systems that include disparate networks and equipment, which is why a number of reports on interoperability have tended to focus on such systems. But it is not just about technical compatibility; there also has to be a desire and a will to bring together different working practices and terminology in order to provide a shared common understanding of all aspects of operations, including communication. Interdepartmental jealousies and, in some cases, a silo mentality need to be put aside. Much work needs to be done to ensure that responding agencies are kept abreast not only of changes being made in their own organization but also of those being made in the other responding organizations. Information on interoperability programs and policies needs to be disseminated, and mandated measures need to be taken to ensure that they are acted upon.

Interoperability is not just a concept; it should be part of the operational doctrine of all agencies that have a role to play in protecting the public from the types of crises that occur today. It is the foundation of effective multinational and interagency operations. Opportunities to train and exercise together followed by multiagency workshops, debriefings, and follow-up study days, which will assist in overcoming existing barriers of organizational culture and differing priorities, must be seized upon as the driver toward greater interoperability.

Conclusion

Although this article mainly focuses on responding agencies, the same methods apply to any organization be faced with a crisis, particularly those multinational companies that operate across state borders and in different languages. Similarly, international nongovernmental organizations should work toward greater interoperability to avoid duplication of effort when responding to major crises like the Haiti earthquake.

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See Also: Collaboration; Command and Control; Coordination; Crisis Communications; Emergency Management, Principles of; Information Vacuums; National Incident Management System (NIMS); Pre-Crisis Training and Planning; Training.

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Interregional Crime and Justice Research Institute, UN (UNICRI)

The United Nations Interregional Crime and Justice Research Institute (UNICRI) is one of a number of global research and training institutes of the United Nations. UNICRI, headquartered in Turin, Italy, is autonomous, led by a board of trustees, and reports directly to the UN Secretary-General. Its purpose is to encourage crime prevention and criminal justice initiatives in the member countries of the UN. It provides training, fosters research, and publishes and makes research available. Among the issues targeted by UNICRI are human trafficking, emerging crimes, and terrorism. In its role of preventing terrorism, UNICRI has a responsibility to help provide security for major events. In addition to efforts relevant to all countries, the organization works with country-specific projects. UNICRI focuses on making relevant information and resources available to those responsible for law enforcement and criminal justice in the member countries of the UN.

UN Secretary-General U Thant provided for the founding of the United Nations Social Defence Research Institute (UNSDRI) in 1967. UNSDRI was charged with preventing both adult and juvenile criminality by means of both research and supportive actions. The institute became operational in 1969, with its headquarters in Rome. In 1989, the name was changed to the Interregional Crime and Justice Research Institute (UNICRI) and its original purpose was affirmed and expanded. In 2000, UNICRI moved to Turin, Italy. UNICRI maintains a Liaison Office in Rome to interact with the Italian government, other governments, and other organizations. Most UNICRI efforts are carried out in cooperation with other international entities.

UNICRI works as a part of the United Nations Crime Prevention and Criminal Justice Programme Network. This network is made up of a number of organizations devoted to crime prevention and criminal justice issues. Much of the work of UNICRI is done through its Applied Research Programme. The work of this division is focused in the following areas:

- Emerging Crimes and Anti–Human Trafficking
- Security Governance and Counter-Terrorism Laboratory
- Justice Reform
- Post-Graduate Training

Among the emerging crimes of concern are cyber-based threats and human trafficking. UNICRI is constantly seeking to resource member states in dealing with these threats. Innovation is required to stay current with the constantly developing methods of criminals. Trafficking in people is a growing and dangerous trend, with 80 percent of the victims being women and children. Multinational crime organizations are deeply involved in this trade. UNICRI has been fostering projects to prevent this trade and to rehabilitate the victims of this illegal trade. The work of UNICRI in this area has been conducted in a number of countries and in areas where UN peacekeeping operations are ongoing.

Security Governance/Counter-Terrorism is the UNICRI program that focuses on event security and preventing acts of terrorism. UNICRI works as a part of the United Nations Counter Terrorism Implementation Task Force (CTITF). This task force was instigated by the UN in 2005 to provide a unified effort among UN interests to prevent terrorism. UNICRI has organized conferences at the regional and international levels for law enforcement workers. One aspect of this program is the effort to make the move to terrorism less appealing. Much of this work is focused on reaching those in prisons who might be radicalized or might become radicalized. UNICRI seeks to promote best practices for prisons and to encourage the rehabilitation of those incarcerated.

An aspect of Security Governance/Counter-Terrorism is major events security. Because the security aspects of major events is so important, unique opportunities are provided for the advancement of programs that will enhance a country's overall security practices. Two regional implementations of major events security have been organized: one for the Americas and one for Europe. Both of these seek to provide a platform for some uniformity in quality of the security provided at major events so that individuals can feel some degree of safety in attending these occasions. Manuals of best practices, or user guidelines, have been designed for each of these regions. In 2009, UNICRI began the Centre on Public-Private Security Policies. This effort is the beginning of a project, to be piloted in Portugal, to develop protection of vulnerable targets worldwide. Vulnerable targets include transportation and financial interests as well as tourism-related sites and energy-related locations. As with most of its initiatives, this one is carried out in close coordination with other entities with similar responsibilities and goals.

The institute continues to focus on justice reform issues around the world. A number of countries have benefited from UNICRI projects that fostered the reform or development of justice systems. In Mozambique, UNICRI carried out a three-year project seeking to provide juveniles better protection in the judicial system. Rehabilitation of minors caught up in the legal system was a part of the emphasis. Support for street children in Argentina and Uruguay has also been part of the work.

The Training and Advanced Education (TAE) unit of UNICRI helps provide the postgraduate training related to the objectives of the institute. This work is done in partnership with schools of higher education around the world. Specialized training is also provided when called for by those in the judicial field, especially in developing countries.

In the 1970s the organization, working with the United States National Clearinghouse for

Criminal Justice information, established an International Clearinghouse on Crime, Deviance and Social Control. The UNICRI library supports the research of the institute as well as that of other cooperating entities.

UNSDRI has published the *World Directory of Criminological Institutes* since 1974. In the 1990s it began the International Crime (Victim) Survey, an authoritative resource for quantitative crime statistics.

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See Also: Civil War; Cyber Crime; Cyber Security; Cyber Warfare; Ethnic Cleansing; Hijackings; Hostage Taking and Negotiation; Human Trafficking; Interstate War; Land Mines; Missiles; Sabotage; Suicide Bombings; Terrorism; Threat Detection; Vulnerable Populations; War Crimes; Weapons Trafficking.

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Interstate War

Interstate war is prolonged, organized conflict between two sovereign states (the belligerents), in contrast with civil war, a war fought between factions within a state. Typically, conflicts are considered war, in the modern era, only if they result in at least 1,000 violent deaths per year. Conflicts below that threshold are usually considered "low-intensity conflicts" by the United Nations and the United States. Low-intensity conflicts may be fought between small groups or may rely primarily on low-lethality tactics like psychological ops, tactical strikes, or attacks resembling terrorism. (Terrorism lacks a consensus definition. Although it originally referred to the use of violence by belligerents for the sake of emotional impact—violence that terrified the opposition rather than simply serving the practical end of reducing their numbers—in the 21st century it has become associated with nonstate actors, especially in American usage.)

Conventional warfare seeks the reduction of the opponent's military capability through conventional attacks, that is, with no or limited deployment of nuclear, chemical, or biological weapons. Such wars may be either interstate or civil. In the second decade of the 21st century, all of the ongoing wars are civil wars. (Even taking civil wars into account, there has been a definite decline in armed conflict in the world since the 1950s, though this does not mean, clearly, that all areas have experienced a decline locally.) The war in Afghanistan, for instance, is an internationalized civil war, an important distinction. An armed conflict between Sudan and South Sudan can no longer be considered a civil war because South Sudan has gained its independence, but neither has the casualty toll exceeded the low-intensity conflict threshold.

Shaping the Modern World

Interstate wars have shaped the modern world, contributing some or all of the motivation for such phenomena as the colonizing of the New World, the sale of the Louisiana Territory to fund the Napoleonic Wars, both European and Japanese imperialism, and the formation of the United Nations, to name just a handful of examples, the absence of which from the modern world is unimaginable. War was endemic for many, maybe most, prehistoric communities: Our early ancestors were in a constant state of war, around which many rituals developed and from which many cultural institutions were derived. Raids by warring tribes distributed goods in much the same way trade routes did, and abductions, whether of women to take as mates or men to take as prisoners of war, prevented the community's gene pool from becoming stagnant. The evolutionary role of war—whether we are possessed of an instinct for it, and to what extent our genome has been shaped by it—is an area of great interest and few conclusions. That there is no agreement on the motivation behind war is a problem too little discussed, especially in the public sphere, where it is hidden by louder discussions about the motivation for and justness of any specific war.

Modern warfare is, at least in theory, bound by the international laws of armed conflict, which include the agreements of the Geneva and Hague Conventions as well as other treaties and customs. For instance, noncombatants and anyone not engaged in hostilities are supposed to be protected; for this reason, certain strategies of attack that result in significant civilian casualties, such as the destruction of dams, are forbidden. Attacks must always be directed at military targets. The killing or torturing of enemies who surrender is forbidden, and captured prisoners must be treated humanely. The wounded and sick must be cared for, and the Red Cross and Red Crescent must be allowed to provide medical aid and humanitarian relief. Some of the requirements of the laws of armed conflict are much older than the Geneva and Hague Conventions, such as the tradition of the white flag as the flag of truce. The United Nations and other international bodies exist to enforce these laws and to seek prosecution of war crimes.

Shortages and Rationing

One of the crises faced in a war is shortages of specific goods and resources, which are often dealt with via a centrally controlled distribution system called rationing, in which the ration is a specific portion of a resource. Military rationing is standard, and of special importance in the navy, where the length of voyages historically prolonged the period of time between resupplying. Giving each man a specific ration not only of food but also of goods like rum and tobacco not only ensured fairness but also created a barter system—with nonsmokers trading their tobacco for other goods, for instance—that served to boost morale (because the final distribution of goods is fair but nonidentical) and has become part of the traditions of military life. In some wars, even bullets and other supplies critical to the mission itself must be rationed.

Civilian wartime rationing (as opposed to the peacetime rationing of planned economies) is a more recent phenomenon and became common in Europe during World War I; it serves to conserve certain resources for the war effort, fairly distribute other goods that are scarce (often as the result of limited trade because of the war, or home front manufacturing activity being focused on the war effort), and create a sense of solidarity. The rationed good is not always the scarce good: when the United States rationed gasoline during World War II, it was primarily to reduce civilian driving in order to reduce wear and tear on tires, thus conserving rubber. Tires, in fact, were the first item rationed: tire sales were temporarily halted four days after the attack on Pearl Harbor, and in the next three weeks volunteer-staffed tire rationing boards were established around the country. A ration of tires was allocated to each board based on the number of vehicles registered in its jurisdiction, and the board redistributed them on an as-needed basis. Sales of civilian automobiles, bicycles, and typewriters were all temporarily halted for the same reason. A national speed limit of 35 miles per hour was imposed, though the extent to which it was enforced isn't clear. At the time, the United States lacked the means to manufacture synthetic rubber, and the growth of automobile popularity in the previous two decades had already stretched thin the world supply of natural rubber. Soon, in order to redirect manufacturing efforts, many industries were halted, mainly those manufacturing consumer goods like sewing machines or washing machines, so that production could be redirected to the manufacture of arms and other military needs.

Volunteers staffed ration boards, which rationed a variety of goods at different times during the war, including gasoline, fuel oil, bicycles, shoes, silk and nylon, stoves, meat, sugar, lard, cheese, butter and margarine, all processed foods and dried fruit, canned milk, coal and firewood, and jams and jellies. Rationing also eliminated panic buying by would-be hoarders preparing for an invasion of the United States, which after Pearl Harbor many considered inevitable. Ration classifications were assigned to each individual in a household based on his or her criticality to the war effort. Some goods were distributed evenly, others only to those who could demonstrate a need. Most people with cars and a demonstrated need for gasoline, for instance, were given an A card, the lowest level, giving them three or four gallons of gasoline per week. Truckers received a special T card because of the necessity of gasoline to their work. B cards, carrying a double ration of gasoline, were

Case Study: The Cold War and Mutually Assured Destruction

Though the United States had been uncomfortable with Russia even before the Bolshevik Revolution, and specifically distrustful of the spread of communism since, it was in the reshuffling of the world order after World War II that the Soviet Union was treated as the country's natural-born enemy. The Cold War was a period in which the two countries not only squared off against each other in the space race and proxy wars like those of Korea and Vietnam—each concerned equally with spreading its own political structures while halting the spread of the other's—but also treated an eventual direct armed conflict as an inevitability. This was of special concern given that World War II had ended with the development and deployment of the first nuclear arms; there is a sense in which the start of the Cold War should be dated from August 29, 1949, the day the Soviet Union detonated its own nuclear bomb, making a true nuclear war—one in which each side possesses nuclear weapons, rather than one side using such weapons to gain asymmetry over the other—a possibility. It was still some years before both sides became triad nuclear powers, possessing strategic bombers, intercontinental ballistic missiles, and submarine-launched ballistic missiles.

The purpose of becoming a nuclear triad is to ensure a nation's capacity to retaliate. By the early 1960s, even as many hoped some of the energy of the conflict was being redirected into the space race, each country had developed a nuclear arsenal vast and varied enough that it could not be wiped out by a surprise attack. The Cuban Missile Crisis was concerned, essentially, with each country's desire to place missiles close enough to the other country to be available for retaliation, even though each acted as though the other's missiles were being positioned for first strikes. Russian missiles in Cuba, American missiles in Turkey—above all, what these would guarantee was a launch capability that would survive the first round of a nuclear war, by being placed so far from home and so near to the enemy.

It has perhaps become easy, given the effect on the United States of the 21st century and the many high-profile natural disasters, to forget that nuclear war remains the direst catastrophe humankind has made plans for. An entire genre of fiction developed around speculation of what life would be like after the "destruction" of the world by nuclear war; a cottage industry sold fallout shelters, consumer Geiger counters, and barrels of freeze-dried foods; schoolchildren learned to "duck and cover." During the 30 or so years between the achievement of this capability and eastern European communism's forfeiture of the Cold War, the doctrine of mutually assured destruction (MAD) developed. The doctrine was simple: nuclear weapons are so devastating that if both sides retained second-strike capability (the ability to retaliate after being attacked), neither side could survive; if neither side could survive, neither side would attack.

Both the strategy and the acronym were introduced by John von Neumann (1902–57), the most gifted mathematician in modern history and the inventor of game theory, which permanently changed the American approach to war. Some blame mutually assured destruction for redirecting Cold War aggression to proxy wars, arguing that neither side would have devoted the resources they did to supporting their respective sides in the Korean and Vietnam Wars except as a surrogate for the satisfaction of a direct attack; while a valid theory, this denies or downplays the many other factors driving the Cold War proxy wars. What MAD did do, though, was force each side to spend massive resources on building up and improving nuclear arsenals it hoped not to use, in order to retain second-strike capability while attempting to attain nuclear primacy (the ability to wipe out the enemy's retaliatory capacity in the first strike). Late in the Cold War, it also motivated each side to develop other strategies: the American Strategic Defense Initiative (Star Wars) was designed to prevent a first strike by the Soviets, while the Soviets' Dead Hand program was built to launch a retaliatory strike automatically, even if there were no survivors to give the order.

Today, the doctrine of MAD is no longer a major component of American foreign policy, though it is arguably one of the factors governing the relationship between India and Pakistan.

awarded to defense industry employees and military personnel. X cards were given to those who were not subject to rationing: police, firefighters, civil defense workers, clergy, and, in some cases, those who could pull the right strings.

Many historians argue that rationing actually exceeded the level of what was necessary. This could be explained as a matter of caution, especially given the scale of the war and the number of new technologies used to fight it. It could also be that rationing served a morale purpose, by engaging the public in the war effort regardless of their occupation and keeping them constantly aware of the shortages experienced by the men abroad. Rationing ended in 1946 and has not since been adopted in the United States on such a wide scale, though other countries have relied on it, and a different system of gasoline rationing was adopted during the 1970s oil crisis to deal with oil shortages.

The expense of the war effort during World War II created other crises to deal with as well. Many people absorb the lesson that the industrial activity of World War II ended the Great Depression, without considering the mechanisms by which the bootstraps were pulled. Rationing helped prevent inflation, for instance, as demand outstripped supply. Price controls did the same and were applied even to many unrationed goods. The Office of Price Administration was established in 1941 and empowered to place price ceilings on all products except agricultural commodities.

Wage controls were especially important given the decade of employment crisis that had preceded the war, as many had shown in the 1930s that the Depression had made them willing to work for lower wages than they would previously have considered, because going hungry was preferable to starving. Wage controls prevented employers—in sudden need of labor to deal with a massive surge in manufacturing output coupled with the loss of much young male labor to the draft—from taking advantage of the surfeit of idle hands. Government programs encouraging investment in war bonds and the need for personal savings accounts and insurance policies succeeded in raising consumer savings to an all-time high, which helped cushion the postwar recession. Every major war loan drive exceeded its goals. Further, scrap drives recovered valuable metals, and discarded cooking fats were reclaimed for making soap; wartime recycling efforts seem to have been far more successful than they were in later decades.

The need for labor brought workers into the workplace at wages they would not otherwise have been paid. Although the image of Rosie the Riveter is well remembered, World War II was nearly as significant in the effect it had on the employment of nonwhites as on the employment of women, with many blacks and Native Americans finding factory work that had previously been denied to them, or at wages higher than they would have earned a decade earlier.

The draft itself, of course, is a wartime—and sometimes peacetime—crisis management tool, used to conscript labor for the military without relying solely on recruitment drives. The draft has a long history in the United States but was not used on a national level until the Civil War—even then, only about 8 percent joined because of the draft (and most of those were paid substitutes taking the place of draftees). The draft was the primary means of raising manpower in both world wars; during the Cold War it was altered to include a separate "doctor draft" for medical doctors, in order to ensure a steady supply of professional medical care for combat troops. Although the draft always had its critics, and conscientious objectors, the Vietnam War transferred its unpopularity to the draft used to fight it, enough so that when Richard Nixon—the nominee of the putatively pro-military Republican Party—campaigned for president in 1968, one of the planks of his platform was abolishing the draft.

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See Also: Arms Control; Biological Weapons; Civil War; Continuity of Government; Ethnic Cleansing; Failed States; Income Inequality and Labor Unrest; Land Mines; Peacekeeping; Political and Organizational Leadership; Post-Traumatic Stress Disorder; Revolution; Terrorism; War Crimes.

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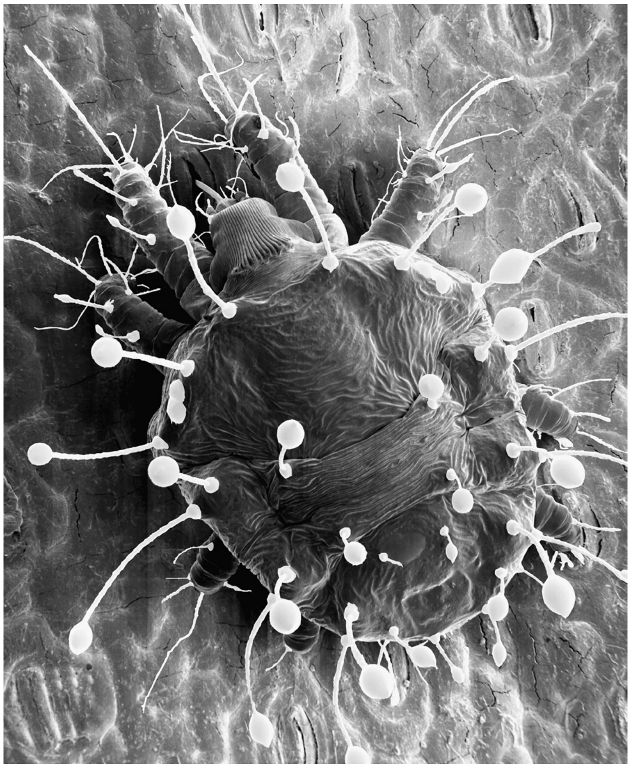
Invasive Species

An invasive species is an organism that has moved from its native habitat to one that provides it with proper conditions so that it proliferates in ways that interfere with the proper functioning of the ecosystem of its new habitat. Crises can arise from the upsetting of this ecosystem as a result of the impact on other living organisms or interference with a natural geographical feature. A crisis involving an invasive species can involve ecosystem alterations; dangers to people, pets, and naturally occurring wildlife; disruption of transportation arteries; and economic damages. Management of invasive species is difficult. Research and monitoring are essential for any progress.

Prior to the ease of travel and transport experienced nowadays, natural geographic barriers mitigated against the spread of species across the world. Features like oceans, deserts, and mountain ranges were effective in preventing the spread of nonnative organisms. Globalization's resulting increase in the movement of products from many different locales through ever-increasing modes of transport brought the proliferation of invasive species. The earliest settlers to the Americas inadvertently introduced earthworms to portions of North America where there were none. Forest floors were impacted by the relentless work of the worms, and change in the understory led to change in the forests. The quest for beautiful gardens led to the importation of nonnative plants. Some of these were not invasive; however, others created a virtual tidal wave of crisis impacts. Chinese privet and Chinese tallow are examples of plants brought into the United States for ornamental purposes. Both have spread rapidly, taking over thousands of acres and crowding out native species. Crisis managers have led projects resulting in large expenditures for eradication efforts, which have not been universally successful.

Another source of invasive species is the international pet trade. Imported pets that escaped or were released by their owners resulted in crises. Southern Florida has experienced a dramatic increase in the number of nonnative snakes, especially in the Everglades. These snakes are rapidly impacting native species and have prompted a crisis response.

South Louisiana has seen much damage to levees and canals through the increase in the population of nutria, native to South America. Nutria were brought in as a source of fur. The demand for fur was far outpaced by the multiplication of nutria population. Louisiana imposed a bounty payable to those who turned in nutria tails. One



The red palm mite, Raoiella indica *(magnified about 300x), is an invasive species from the Caribbean. It is known to feed on 42 palm species in the Caribbean region and Florida and is a serious pest risk for the subtropical areas of the United States.*

parish sheriff deployed his deputies to canal banks to shoot nutria. Crises have been created by the increased dangers of floods and coastal erosion caused by this invasive species.

The U.S. National Park Service has developed a multipronged strategy to deal with the invasive species on its lands. One approach is to bring in interested parties, agencies, and governments to help deal with the issues. The Park Service also maintains an active process of monitoring the invasive species that are found on its lands. Prevention measures have been instituted, along with measures that will ensure early detection and a rapid response. There are efforts to treat outbreaks to eliminate or control invasive species and to restore the native habitat that has been impacted by the invasion.

President Bill Clinton established the National Invasive Species Council in 1999. The importance of the role of this council was shown by the inclusion of the following cabinet secretaries as members in the original executive order: State, Treasury, Defense, Interior, Agriculture, Commerce, and Transportation. Added later were the secretaries of Homeland Security and Health and Human Services. The council was given, among others, the task of coordinating U.S. resources for dealing with the issue of invasive species. It was to work with existing agencies to carry out this assignment. The council was also charged with the role of developing a national plan for managing invasive species.

In cooperation with the National Invasive Species Council and other groups, the National Agricultural Library created the National Invasive Species Information Center. This center serves as a reference resource related to invasive species.

Crisis managers face the challenge of the diversity of potential problems posed by invasive species. Because the invasion can be underground, above ground, in the air, or in the water, the reaction to each threat requires different resources, skill sets, and human interactions. A single strategy for the multiplicity of potentialities is impossible. Accordingly, crisis managers must plan on monitoring and advance planning. Regulatory complexities may reduce the effectiveness of efforts to deal with an invasive species crisis. Multiple governmental levels may overly complicate an effort to come up with a unified approach. Added to this is the desire of many nongovernmental organizations (NGOs) to deal with the issues involved. State governments as well as local governments have developed plans to deal with invasive species. A number of nations also have developed plans to deal with invasive species.

Adequate communication is essential for the crisis manager to adequately address an invasive species crisis. The problem can be deeply entrenched into an ecosystem and require a significant response. Communication between the various stakeholders is needed for appropriate measures to be taken. Early warning can possibly lead to mitigation of the spread. Crisis management of invasive species requires time-consuming and expensive monitoring.

The problem of invasive species is not likely to level off. Even with a global economic downturn, human migration, a gradual warming of the globe, a growing world population, and easing of restrictive import/export policies foretell an increasing invasion of plants and animals that succeed in their new environments with few of the inhibitors of their native habitat. Crisis managers will be forced to cooperate with an increasing number of biological experts to predict and mitigate crises created by the explosion of invasive species.

Progress is being made in discovering invasive species problems, and there are growing cooperative efforts to address them. The shortfall is in the implementation of effective strategies. Additional research is needed in many areas for the crisis manager to effectively manage even a significant portion of an invasive species crisis.

Ken B. Taylor
New Orleans Baptist Theological Seminary

See Also: Climate Change Adaptation; Environment Programme, UN (UNEP); Food Security; Infestations, Parasite; Marine Travel; Resource Collapse; Resource Management.

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Journaling

Journaling is a relatively simple action that requires time and focus to become a habit in a person's life. Each journal is somewhat unique; there is no one best way to create one. No matter the intent of keeping a journal, the writings can serve many purposes. The key to journaling is consistency in taking the time to write thoughtfully and with some purpose each day. Within the context of crisis management, journaling can be productive and assistive in several ways.

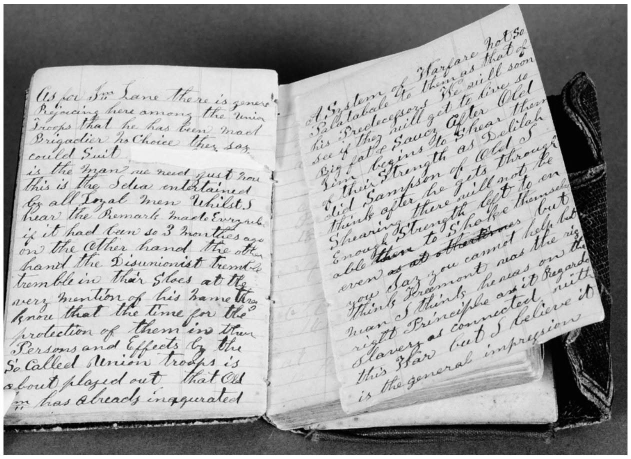
Developing a journal involves a process called reflective writing; research indicates that reflective writing helps the writer to develop a deeper understanding of the events that are the subject of the writing. Although there is no one best way to keep a journal, there are some commonly recognized practices that can help. Journaling should be done at least daily; some write twice a day, once first thing in the morning and again in the late evening before retiring. Journaling works best when it is done somewhat informally, the simpler the better; and when the writer avoids trying to write in a particular style or worrying about writing mechanics, spelling, and grammar; in other words, writing for quantity instead of quality. A journal is intended for the journaler, so it should be kept personal; it is intended for the writer's reference, even though it may someday help others understand past events.

Preventing the Crisis

Journaling can prevent crisis by becoming an early warning system. Consider on a large scale that much of what is known about historical, pre–weather records data is from journals. Explorers have traditionally studied the journals of others to glean information that will help them. Journals help the writer detect patterns because the process aids memory. After a crisis occurs, a journaler may return to the pre-crisis entries and identify indicators that foretold the coming event. As post-crisis time progresses, the journaler may recognize the same patterns developing and be able to either interdict the crisis or be better prepared for what is to come.

Maintaining a Frame Through the Crisis

For the journaler in the midst of a crisis, writing contributes to the maintenance of mind. The journaler becomes a chronicler of events and, for the moment, is taken away from being a victim to being an observer engaged in documenting what is seen. There is great value to be gained in studying journals from individuals engaged in warfare and catastrophe, where the journaler has detailed his/her view of the events unfolding; these are sometimes written from a personal viewpoint and other times as though the journaler were simply a recorder of the events that occurred around him or her.



A Civil War diary being prepared for digitization at Iowa State University. Civil war journals have provided historians with intimate accounts of the experience of soldiers and civilians involved in the war effort.

Writing about the stress that is felt in times of crisis helps release those feelings into words on paper. Research shows that journalers report they gain hope of coming through the adversity. Writing through crisis allows the journaler to process the information around him or her in a way that promotes process analysis, and many journalers report gaining insight and even finding solutions through the process of writing.

Crisis counselors suggest that taking time each day to write about things for which journalers are thankful may help them maintain a frame of positive thought through the event. During times when the journaler feels doubt or overcome by despair, the journal becomes a reminder that there is hope and a collection of self-identified positives on which to focus thoughts. This contributes to the positive attitude needed to maintain control through difficult times.

Recovering From the Crisis

Post-crisis journaling has proven to be a valuable tool in coping with the issues of post-traumatic stress disorder, personal loss, and the feelings of helplessness that often are associated with crisis survivors. The journal represents a safe release for emotions, fears, and concerns. Writing reflectively allows the writer to think through the event and understand better the things that occurred and why he or she made it through, thus lessening the potential for survivor regret—the feelings of "why did I survive when others did not?"

Post-crisis journaling is also recommended for those working with survivors or helping in other ways with the response. In the process of writing about their work, journalers are constantly reminded that they are a part of the solution and are helpers in recovery. Research has shown that journaling, together with crisis counseling, allows a better transition of responders back to everyday life. Again, the process of reflective writing helps journalers keep perspective with the reality of their life away from the post-crisis response.

Documenting the Crisis

After a crisis passes, the journal serves as a record of the process of moving through the adversities. The journal entries made during the crisis reveal observations of what happened and may be the only link to understanding sequence. Entries also reveal ways in which journalers and those around them were impacted by the crisis and can provide insight into survival techniques. Although a single journal presents only one view, it is one that is from the inside and gives personal-level meaning to the crisis.

As an example, news stories from the American Civil War provide insight into the broader spectrum of the war and the battles fought during the era. However, the journals of civilians and soldiers who were engaged in the war give deeper meaning to the individual impact the era had on life and reveal unsensationalized accounts of battles that help historians understand the broader view of the reports.

Getting Started

Journaling is recommended for many reasons, including research documentation. The process produces many of the same benefits for writers not embroiled in a crisis situation. In a time before television and radio, and when society was not so mobile, many people kept journals. The best way to start a journal is to get some paper and a pen or pencil and begin with what happened this day, and tomorrow make time to write again.

George R. Franks, Jr.
Stephen F. Austin State University

See Also: Documentation; Historical Analogies, Use of; Post-Traumatic Stress Disorder; Resiliency.

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L

Land Mines

Land mines are generally referred to as explosive devices that are designed to destroy personnel employed in an armed force or to severely damage equipment. They are detonated through pressure that is activated by a specific target's action, the passage of time, and/or controlled means. The social and economic cost of land mines is tremendous. Once set in place, a mine may remain active for up to 50 years. Even when used according to the generally accepted doctrine of marking and recording, antipersonnel mines result in deaths and severe bodily injuries long after the end of a war or conflict, and this issue remains to be a fatal problem all over the world. Moreover, mine clearance is a costly task that exceeds the budget of even some wealthy nations. Currently, there are 50 to 100 million land mines in more than 80 countries around the world. Deactivation is estimated to be at 100,000 mines per year versus approximately 2 million that are laid annually. If today's current detection and deactivation continues at this rate, removing just all existing mines (without including those yet to be placed) will take at least 500 years.

According to figures provided by *The Monitor*, a total of 4,191 new casualties were recorded in 2010, compared to 4,010 in 2009 and 5,502 in 2008. During 2010, officials cleared more than 388,000 antipersonnel mines and over 27,000 antivehicle mines throughout the world. Further, *The Monitor*'s 2010–11 report included 12 countries that produce antipersonnel mines, namely China, Cuba, India, Iran, Myanmar, North Korea, Pakistan, Russia, Singapore, South Korea, the United States, and Vietnam. In addition, Israel, Libya, and Myanmar were identified as three governments that have laid antipersonnel mines.

Land mines can be categorized into two types: antitank (AT) and antipersonnel (AP). For the most part, explosive charges are concealed beneath the land's surface in order to slow enemy advancements during war. Usually, AT mines are designed to immobilize vehicles by destroying one or more vital driving components. On some occasions, however, the vehicles' crew members may also be destroyed. Conversely, AP mines are designed to kill or incapacitate their victims; however, some AP mines may also break or damage the track on armored vehicles.

By the end of World War II, roughly 300 million mines were buried in an effort to destroy enemy tanks. However, these weapons had vital drawbacks given that it was possible for foot soldiers to disable them before detonation and use them against the very army that initially buried them. In order to prevent enemy soldiers from deactivating AT mines, armies therefore developed antipersonnel mines that encircled their antitank mines. Because of the irresponsible use and indiscriminate killing, however, antipersonnel mines were severely stigmatized by the international community.

Social and Economic Costs of Land Mines

Although there is currently a lack of reliable data pertaining to international figures related to casualties attributed to land mines, it has been suggested that 70 persons every 20 minutes a day are either killed or injured, which totals more than 20,000 people a year. On the other hand, costs associated with producing a mine may be as little as $3, yet the cost of removing one ranges from $300 to $1,000.

An ordinance to clear unexploded antipersonnel mines is a difficult and hazardous task for even the experts. Because of accidental explosions, for example, at least one trained mine disposal expert will be killed and two will be injured for every 5,000 mines cleared. One of the most obvious implications is that land mines create uninhabitable territories that result in millions of useless acres. Further, it is not uncommon for individuals who positioned the mines to forget where they located them. Thus, land mines that are positioned in agricultural areas severely impact the locals' livelihood as well as their annual food production. In the event that no mines existed in their lands, agricultural production would be 200 percent higher in Afghanistan and 135 percent higher in Cambodia. Moreover, tourism that contributes to a nation's postwar economy can be severely hampered by the presence of land mine fields.

As would be expected from antipersonnel devices, the most common injury suffered among survivors is the loss of a leg. Unfortunately, young children are particularly vulnerable to land mines in three ways: (1) out of curiosity, they are likely to pick up strange objects; (2) the presence of posted warning signs is useless if a child is too young to read or is illiterate; and (3) children are far more likely to die from mine injuries than adults.

Afghanistan, Angola, and Cambodia have suffered 85 percent of the world's land mine casualties. In fact, mines are so common in Cambodia that they are now used for fishing in order to protect private property and even settle private disputes. Overall, African children live on the most mine-plagued continent, with an estimated 37 million mines embedded in the soil of at least 19 countries. For example, Angola alone has roughly 10 million land mines that have been responsible for an amputee population of 70,000, of which

A U.S. soldier performs a ground sweep for land mines outside Usmankhel, Kandahar province, Afghanistan, December 18, 2011. Agricultural production would be 200 percent higher in Afghanistan if the mines were not a constant hazard.

8,000 are children. Further, approximately one-half of Rwanda's children have become victims of 50,000 to 100,000 antipersonnel mines since May 1995.

On the other hand, children living in at least 68 countries today are threatened daily by perhaps the most toxic mine pollution contamination facing humankind. According to *The Monitor*'s 2010–11 report, more than 110 million land mines of various types in addition to millions of unexploded bombs, shells, and grenades remain hidden throughout the world just waiting to be triggered by innocent and unsuspecting persons.

Measures to Counter the Land Mine Problem

There are several measures that can mitigate problems from land mines: a total ban on land mines, demining, and increasing awareness of land mines.

Mine ban: In reality, only a total ban can help eliminate the manufacture, export, and use of land mine weapons. The best-known ban, which became effective on March 1, 1999, is the Ottawa Treaty, or the Anti-Personnel Mine Ban Convention, officially known as the Convention on the Prohibition of the the Use, Stockpiling, Production, and Transfer of Anti-Personnel Mines and on Their Destruction. The treaty called upon all states to cease the use, transfer, and production of antipersonnel mines. As of September 2011, 157 countries, or 80 percent of the world's nations, have joined the Mine Ban Treaty, and 87 of these states have completed the destruction of their stockpiles.

Demining: Demining is defined as the action of removing land mines, booby traps, and unexploded ordinances (UXO) from an area. Given that mines and booby traps are typically hidden and most often buried, two main demining goals include the following: (1) to enable a military force to achieve its objectives while preventing human losses and (2) to return the land to productive use. As previously mentioned, mine removal is a lengthy and expensive business. Although land mines can be spread carefree at rates of over 1,000 per minute, it may take a skilled expert an entire day to clear by hand 20 to 50 square meters of contaminated land.

Humanitarian demining requires that the entire land area be free of mines. For example, the United Nations specified a clearance standard of 99.6 percent, or that a maximum of four mines are missed for every 1,000 that are removed from the ground. Currently, the only guaranteed way to achieve the United Nations' requirement is through manual demining methods, a procedure in which mines are manually detected and neutralized by a human deminer. Generally, demining includes the following methods: (1) electomagnetic induction, (2) ground penetrating radar, (3) nuclear quadruple resonance, (4) infrared [IR] and hyperspectral methods, (5) electric impedance tomography, (6) X-ray backscatter, (7) acoustic and seismic systems, (8) vapor sensors, (9) robotics, (10) thermal neutron activation, (11) neutron backscatter, and (l2) data fusion. In addition to these methods, trained dogs have long been used to sniff out land mines in war-torn regions. Today, even rats and bees are used for mine removal tasks.

Mine awareness: Although prevention efforts are already in place, namely, mine-awareness programs that are designed to teach community residents how to identify land mines or avoid suspected mine field areas, these programs also require expanded support from the public health community. High-risk areas and populations can be identified through hospital surveillance and cluster surveys. In turn, this facilitates the allocation of limited resources as well as the development of effective prevention strategies.

UNICEF stated that protecting children calls for a major international commitment based on large-scale mine clearance and the development of child-oriented awareness programs as well as physical rehabilitation to offset the results of land mines. Essentially, children living in high-risk areas should receive innovative education awareness through child-to-child approaches, role-playing, and the use of land mine survivors as educators. In addition, greater attention should be placed on training local mine clearance teams and adapting local needs to effective international techniques.

Kadir Akyuz
Independent Scholar

See Also: Arms Control; Border Disputes; Hazard Mitigation; Hazardous Materials; Improvised Explosive Devices; Terrorism.

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Legal Liability

Legal liability during a crisis pertains to the decisions that may be the basis for a lawsuit. A significant role in managing legal liability requires litigation mitigation, which is characterized by three elements: (1) reduction in the exposure to legal claims, (2) improvement of life safety, and (3) enhancement in property protection. Attorneys' main concerns for legal liability during crisis management relate to these three elements.

Legal concerns are related to many issues in crisis management and crisis standards of care. Laws assist with the classification of the type of emergency; the creation of the infrastructure for how to prevent, detect, and respond to a crisis; and the authorization of the performance or nonperformance of different actions by a host of different actors. Laws also determine the extent of legal liability, or responsibility, for potential and actual harms that arise during crises. The legal framework plays a significant role in the level of support for a fair, effective, and consistent response to prepare for the standard of care during an emergency event.

Sources of Crisis Management Law

Crisis management law in the United States is rooted in the three levels of government: federal, state, and local. Immunities allow protection for emergency managers under certain circumstances. The National Fire Protection Association (NFPA) and post–September 11 federal law have set new standards that apply to the entire nation during an emergency. The accessibility of federal funds for crises allows the federal government to pose criteria for state and local crisis management performance. Many laws affect crisis management's daily activities, imposing duties on certain fields of work. For instance, employers in certain disciplines may be obligated to train their employees in certain conduct during an emergency. In a similar fashion, government-employee crisis managers have the duty to comply with the government's ethics rules.

A common cause of action that may ensue in legal liability is the tort of negligence. Negligence is a common law doctrine that articulates that each person has a general responsibility to act in a reasonable manner at all times in consideration of the circumstances. In legal terms, negligence is defined by five elements: a duty, a breach of that duty, legal causation, personal injury or property damage, and a result. In other words, a person has an obligation to act in a reasonable manner, fails to do so, and this is a proximate cause to the liability. Thus, one's unreasonable behavior that causes harm to another person or property may be subject to legal liability. In the crisis management context, negligence may arise from the failure to perform specific governmental obligations. The unit of government may be legally liable for the failure to properly train or supervise crisis management workers. Another source of liability includes the failure to perform the duties that are accepted as being a part of an emergency manager's duties. Examples that give rise to negligence liability include a commander's lack of knowledge, an executive's poorly made decision, or the failure to adhere to a plan. Another form of legal liability pertains to the failure to comply with a legal duty.

Immunity

Certain factions of the government are privileged to immunity, or protection from legal liability, for the performance of specific activities. Statutes created to respond to disasters and common law offer customary defenses and immunities to protect people who respond in an emergency. The purpose behind the legal notion of immunity is to encourage a certain type of proactive conduct.

Immunity under state law: To protect people from legal liability, state laws incorporate liability immunity for certain acts. The immunity is limited in the sense that the acts must be within the employee's scope of employment for immunity to apply. State emergency statutes frequently contain more specific immunity provisions to protect government executives engaged in critical decision-making procedures during crises. Some states have established broad immunities to shield a variety of employees, rather than only individuals involved in making decisions. Such provisions are generally contained in a state's emergency management laws. Some states also offer immunity for emergency workers, including volunteers. A "good Samaritan" statute may also provide immunity to certain classes of emergency medical responders, although the statute generally does not apply to individuals operating in an official capacity.

Immunities under federal law: The federal government utilizes two tort doctrines to provide immunity: "government function" and "discretionary action." The "government function" immunity refers to long-established governmental activities, such as measures assigned by the Constitution or statute, including collecting taxes, law enforcement, and legislation. These actions are typically solely performed by a governmental entity and performed for the benefit of the public. The government does not profit from such acts. Emergency planning is immune from legal liability as a "government function."

The Federal Tort Claims Act (FTCA) holds the "discretionary action" immunity. The defense focuses on a particular governmental act or decision rather than on the type of activity. The purpose of the act is to protect federal governmental employees at the policy level from being concerned with lawsuits as they make decisions during an emergency. However, if the action does not involve a permitted use of policy judgment, the government employee is not protected.

The U.S. Supreme Court in *Berkovitz v. United States* implemented a two-part test for the use of the "discretionary immunity" defense. The first step requires analyzing the nature of the conduct. If the questioned conduct is not an optional matter but rather an action mandated by a federal statute or policy, then discretionary immunity is not applicable to the conduct. Thus, the employee has no choice but to follow the directives. The court rationalized that, in the absence of a choice, a judgment call could not be made and thus, there is discretion within the conduct to act in defense. The second step applies if there is no statutory or procedural policy that mandates a course of action. The conduct must involve a quantity of judgment, which then may be determined to be the type of judgment that the discretionary immunity was intended to defend. The exemption shields only governmental actions and decisions based on public policy, such as economic, political, or social policy. If the activity is not related to public policy, then the suit may continue and discretionary immunity does not apply.

The decision in *Commerce and Industry Insurance Company* may indicate the potential future evolution of cases brought against emergency management organizations for improper actions during crises. The court reasoned that firefighters violated specific regulations and distinct fire department policies decreed procedures for firefighters to follow at a warehouse fire. The court held the organization and its employees liable for actions that fell outside the established regulatory standards. Therefore, the court held that the city was not granted immunity. Emergency management may be hard pressed to rely on discretionary immunity to protect the unit of government and employees from liability. The holding demonstrates the court's tendency to interpret statutory waivers of government immunity extremely narrowly by analyzing the facts underlying the alleged waiver.

Legal Duties

Local and state emergency management directors have many legal responsibilities. The foundations of these duties are both specific emergency management law and other laws of general application.

State emergency management law: Every state has a set of emergency management laws. These laws generally include specifications that establish a crisis management agency, assign specific organization roles in responding to disasters, assign an executive authority to declare the state of emergency, and allow cooperation in the form of mutual aid with neighboring jurisdictions. Such statutes typically address other aspects of crisis preparedness and response. There tends to be a detailed set of responsibilities for emergency managers pertaining to warning, police, medical, and rescue services. Additional functions may include emergency transportation, plant protection, and weapons defense. Failure to perform the enumerated duties may expose the emergency manager to legal liability.

Standard operating procedures: Emergency response groups employ standard operating procedures to direct their members in daily functions. Legally, standard operating procedures are a form of private law and thus, a violation of the procedure may have internal consequences. Nevertheless, standard operating procedures must be in accordance with specific industry standards and therefore, violations may also be a basis for a lawsuit for negligence. Furthermore, standard operating procedures are typically a reflection of generally accepted safe practices. Thus, an organization's failure to adopt a set of standard operating procedures does not prevent the organization from avoiding legal liability.

Volunteers

Several legal issues may arise during the use of volunteer resources. In order to avoid liability, volunteers must be properly incorporated into the emergency response organization. For instance, the organization may report the competencies of the volunteers to avoid legal liability.

The Volunteer Protection Act of 1997: Several members of Congress contend that the possibility of litigation may discourage people from volunteering for public service. As a result, Congress enacted the Volunteer Protection Act of 1997 to create statutory immunity for the labor pool of volunteer entities. The act preempts state statutes that impose higher levels of liability on volunteers.

There are exceptions to the act, including acts of gross negligence and willful disregard of standards of care, to discourage harmful behavior and to protect victims of disaster from those who do not act in good faith during emergency responses. Furthermore, under the act, volunteers may not be sued for punitive damages if they are acting within the scope of responsibilities set by the nonprofit organization. However, the shelter of immunity is not awarded to the volunteer organization itself. It is important to note that the Volunteer Protection Act does not protect volunteers from legal liability for harm caused while driving a motor vehicle.

Deputize actors: Some states have "deputized" actors during a crisis, meaning the federal government has made them federal agents. These actions can be enacted rapidly, permitting the actor to receive the state's sovereign immunity, a type of protection that exists in many jurisdictions. The complication of this action is that these deputized workers become the legal agents of the state or federal government and therefore must be prepared to perform as the state or federal government mandates, not necessarily what their own institution or employer might require. Thus, institutions and employers may feel a sense of uncertainty and unwillingness to cede that control.

Planning Process

The initial step for crisis management requires a process of planning, which details resources, procedures, and trained personnel needed when a disaster occurs. Several potential liabilities may arise from the duty to plan. Typically, an organization creates and maintains an emergency operations plan, which may be the basis for liability. The absence of an emergency operations plan may also be the basis for a lawsuit. Furthermore, NFPA 1600 requires planning to be consistent with evolving standards. Assuming a legal plan has been established, the failure to implement the plan during an emergency may subject the manager to liability. In federal court, the decision turns on whether the plan is interpreted as setting a compulsory course of action. The court may construe an emergency plan of operation to be a "specific and mandatory" obligation in spite of the fact that it is a private document with no direct legal consequences on the public. Therefore, a violation of an internal policy may lead to a lawsuit if the policy does not leave room for implementing officials to exercise independent policy judgment.

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See Also: Blame, Politics of; Insurance; National Fire Protection Association (NFPA) 1600, 2007, and 2010; Operational Plans; Volunteer Coordination.

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Living Modified Organisms

A living modified organism (LMO) is an organism that has been genetically altered through the application of biotechnology. LMOs are the subgroup of genetically modified organisms (GMOs) that is capable of reproduction and growth. The term generally refers to genetically engineered agricultural products or crops, although it can be applied more broadly to include both bacteria and animals. The alteration of genes is generally achieved through recombinant DNA technologies. DNA sequences are added, deleted, or otherwise transformed to modify the genes of a given organism. Expression of the new genes gives the organism new properties that may include disease resistance, enhanced nutritional or pharmaceutical value, or entirely novel capabilities (such as glowing in the dark).

In 1973, the first LMO was created when a *Salmonella* gene was inserted into the genome of an *E. coli* bacterium. Applications for LMOs have since been found in the fields of biological research, medicine, and agriculture. Living modified organisms are also patentable. In 1980, Professor Ananda Chakrabarty genetically engineered a bacterium to digest crude oil; after Chakrabarty was denied by the U.S. Patent Office, the U.S. Supreme Court ruled in favor of issuing him a patent. Research and development of LMOs continued throughout the 1990s, and genetically modified corn entered the U.S food supply in 1995. Living modified organisms have been identified as having the potential to mitigate against crises such as drought, malnutrition, and disease. Organisms such as corn and soy varietals are being engineered for insect resistance, frost tolerance, and enhanced nutritional value. But LMOs also have the potential to compound these crises and threaten biodiviersity if improperly developed, applied, or monitored. The complexity of these issues has driven the development of national policy and international agreements to responsibly manage the risks associated with this new technology.

Controversy and Regulation

The genetic modification of living organisms has sparked significant controversy. Attitudes about genetic science swing in both directions; some groups believe that the creation of LMOs violates natural law, and others believe that humans, as a species, have been modifying organisms for years through selective breeding and animal husbandry.

Case Study: Genetically Engineered Foods and Famine in Africa

In the early 2000s, many countries in the southern region of the African continent were falling into famine. Multiple years of food shortages, poor crop yield, conflict, and economic decline had depleted food supplies to the point where the local people had been reduced to eating twigs, roots, and, in some reports, household pets. In 2002, according to the United Nation's World Food Programme, 38 million Africans had significant food needs and about $500 million in food aid would be needed to avert famine. The United States responded to the crisis with an offer of food aid—a significant amount of grain. The gift, however, was likely to contain large volumes of genetically modified corn kernels—a living modified organism.

Southern African governments reacted differently. Swaziland, Lesotho, Malawi, and Angola accepted the food immediately. The nations of Mozambique, Zambia, and Zimbabwe resisted the food aid with concerns about biosecurity and the threat to native flora, fauna, and crops. The rejection of the genetically modified food underlined lingering questions and concerns about the ethics and risks associated with LMOs and developing countries.

With the exception of Zambia, all the countries accepted the grain after it had been milled. Milling the corn mitigated the risk of genetically modified kernels germinating and contaminating the local crop populations with modified genes. Zambia held its position, with the president declaring the corn to be "poison" in the belief that the health and medical effects of genetically modified foods had yet to be thoroughly evaluated. The U.S. Food and Drug Administration and Secretary of State Colin Powell challenged his position on the basis that genetically modified crops had been allowed in the U.S. food supply for more than five years with no documented negative effects. Critics condemned Zambian officials for allowing their people to starve; supporters suggested that there was enough genetic engineering–free food in the world to provide relief for Zambians and that current shortages were simply a matter of poor resource management and distribution. After two additional years of famine, Zambia accepted the genetically engineered corn.

In all, the food crisis in southern Africa revealed continued public misgivings about the safety of LMOs and genetically engineered foods. Ethical discussions continue to rage, with the validity of the precautionary principle being called into doubt. Nations around the world are developing and clarifying biotechnology policies in conjunction with the Cartagena Protocol in an effort to balance the risks and rewards of LMO introduction. In 2007, Zambia passed the Biosafety Act to provide for regulation of and guidance to the development of genetically engineered products. The role of LMOs in the developing world has yet to be entirely defined.

There are also fears that certain organisms could be modified to become enhanced biological weapons. In recent years, public opinion of LMOs in the food supply has also soured, with perceived risks greatly outweighing perceived benefits. These concerns, among others, have driven biosafety policy formation worldwide in an effort to balance national, scientific, and public priorities.

National policies on LMOs vary greatly. In the United States, policy allows the growing of large volumes of LMOs (the United States currently produces the largest volumes of genetically modified food), whereas the European Union allows the cultivation of only two genetically engineered crops. China and India are currently utilizing LMOs to boost outputs of cotton, food, and other essential products to provide for the needs of their growing populations.

In many countries, the responsibility for policy development and regulation is shared among multiple governmental organizations—usually agencies in charge of national science, health, environment, agriculture, and trade policies. National strategies for biosafety and the implementation of LMOs are generally conservative, relying heavily on "the precautionary principle," which posits that in the absence of consensus on whether an action or policy may cause harm to the environment or the public, the burden to prove that the action is not harmful falls to those taking the action.

The Cartagena Protocol

Hybridization and cross-fertilization between LMOs and native organisms creates the risk of the "escape" of engineered genes from a population of LMOs to the genomes of organisms in the local ecosystem. The introduction of these genes has the potential to significantly disrupt delicate biological processes and threaten biodiversity. In 1993, the United Nations Convention on Biological Diversity entered into force to protect global biodiversity, and the development of a framework for the governance of LMOs began. The resulting Cartagena Protocol on Biosafety was deployed in 2000 as a supplementary agreement to the convention and entered into force in 2003. The protocol outlines conditions for the exchange, handling, movement, and use of LMOs among nations, with the mission to protect biodiversity. The protocol also establishes the Biosafety Clearing-House to facilitate the exchange of information about LMOs and to maintain an LMO registry.

Risk Assessment and Management

Assessments of public opinion in regard to genetic engineering research show risk aversion and skepticism, especially in reference to the presence of LMOs in the food chain. The framework for risk assessment outlined by the UN's Biosafety Clearing-House is designed to facilitate a scientifically sound and transparent assessment of the threats and consequences posed by the introduction of an LMO into an environment. Each LMO is assessed on a case-by-case basis. Governments can then make decisions on whether to allow the import or use of an LMO based on the assessment. The stepwise methodology begins by setting the scope for the assessment through comparative studies and the establishment of baselines. The organisms, the receiving environment, and the intended use are thoroughly examined to complete the hazard profile. Appraisals of event likelihood, potential consequences, exposure, cumulative effects, system complexity, and general uncertainty complete the risk assessment. Mitigation strategies are identified for risk management before introduction of the LMO, and monitoring methods are put in place to detect changes in both the receiving environment and the organism itself. It is important that the risk assessment process for LMOs be iterative, as each reproductive cycle has the potential to alter genetic content.

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See Also: Biological Engineering Risk; Biological Weapons; Crisis Management, Emerging Trends in; Famine; Food Security; Global Food Crisis; Terrorism.

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Logistics

Logistics in humanitarian operations is described as a set of actions necessary to deliver aid to designated beneficiaries and/or to provide support to relief operations. The logistics process is therefore aimed at transfering goods from a point of origin to one of destination. Logistics defines the process of planning, execution, and control of the delivery of items necessary for the implementation of aid programs. The starting point for logistics actions is the end of the procurement process, though sometimes, as in the case of some humanitarian organizations, procurement procedures can also be included. Main processes included in logistics activities are transport, storage, and control.

Transport

Transport refers to all those different ways through which the delivery of needed goods is organized, that is, by sea, by air, by road, by train. A difference is normally made when planning between international and in-country (or internal) transport.

Transport can be both international and internal. International transport can cross one or more countries before reaching the border of the affected nation (theater) of the humanitarian relief operations. International transport is normally done by sea wherever possible, as it is the least expensive way of moving goods, then by road, train, or internal waterways. Transport can also be accomplished by air; shipping by air is normally done during emergencies when time is critical to saving lives. Once humanitarian aid is in the country, it is normally directed to primary or secondary warehouse facilities before being transferred to the site where the relief project is implemented (construction materials for shelters, medicines for health centers, food for distribution to the hungry).

Maritime transport: Shipping by sea is the most convenient way of transport, able to move large quantities of relief items though not really flexible because it is dependent on large infrastructures. Transport by sea can be done in containers or in bulk cargo, depending on the needs and the commodities. In some humanitarian operations, internal waterways are also used. And in case of flooding or tsunami response, coastal shipping is extensively used to reach people in need.

Air transport: Shipping by air is utilized especially at the beginning of emergencies, when saving time means saving lives. However, air transport is expensive and requires quantities to be limited. Another challenge can be related to the type of infrastructure available in the country to be served. In fact, airports might not always be able to receive deliveries because airports can be limited by the type of infrastructures present in country and by their own maximum capacity.

Air transport is utilized within a country as well; humanitarian cargo and workers are often deployed by air, especially in order to get to the zone of operation as quickly as possible. Air transport in this case is often done by helicopters that can land even where there are no airports. Air transportation is chosen also for technical reasons, sometimes during natural disaster responses when the zone of operations might be inaccessible by road. Security considerations can also affect this kind of choice.

Ground transport: Ground transport is made up of road and railway systems. Ground transport via large trucks is utilized for transferring large quantities of commodities from ports or airports to main warehouses, hubs, and secondary warehouses and is also used to cover the last leg before the distribution site. This latter step is done with smaller trucks or even pickups.

Trucks utilized may be owned by the relief organization, especially where no commercial alternatives are present, but normally private trucks are utilized.

Railway transport: In some operations, transport by rail is also used. This is a cheap and reliable way of moving commodities, but it is not always available and it always needs to be connected with road transport for the final leg.

Storage

Storing the goods in a safe way is paramount for a good operational outcome. Warehousing is an important stage in the logistics chain. Relief items pass through different warehouses from the moment they are produced to the moment they will be distributed. Size of warehouses also changes. Warehouses around sea ports and airports are larger, as they are meant to store a greater share of the incoming commodities before those are dispatched to the various regional facilities that are closer to the organization's warehouses in the area of the implementation. At the main hub, the commodities arrive for the entire project for which the supplies have been procured; those quantities are then redistributed closer to the actual delivery point in smaller stores. However, direct delivery

Supplies are unloaded from airplanes in Port-au-Prince, Haiti, January 17, 2010, five days after the area was hit by a devastating 7.0-magnitude earthquake. The logistics for distributing aid proved nearly insurmountable for the humanitarian and military operations from various countries: The damaged port prevented deliveries by sea; airport infrastructures were damaged, limiting capacity; equipment and manpower were lacking; and an avalanche of assistance came during the initial phase, when coordination was insufficient.

can also be made from the entry points during an emergency in order to save time, reduce handling, and cut costs.

To protect the stocks and guarantee their arrival to the beneficiary in proper condition is not only a matter of protecting items from hazards such as weather, bad handling, and security but also a matter of good management in terms of accountability and control and reporting. In order to maximize program activities and account to donors, it is paramount to know exactly what is stored and in which conditions.

Logistics in Project Planning

When planning and designing relief programs, logistics implications such as availability of supplies and assets should be always taken into account, together with the operational context where the action has to be implemented, including country context, weather conditions, and security. This means that relief plans need to be realistic and adapted to the situation.

Even though the logistics role is commonly perceived as the set of actions necessary to support the delivery of the materials necessary for the implementation of the different relief programs (such as water, sanitation, and hygiene [WASH], shelter, health, or agriculture), each humanitarian organization has a different perception of it. For some, it is purely transport and storage; for others, responsibility of the logistics section might include fleet management, telecommunications, security, facility management, and other support roles.

This might be because of the internal organization of the agency or nongovernmental organization (NGO) or simply that its size and resources do not support having specialized personnel for each function needed, so the limited staff needs to ensure that different tasks are accomplished. In the larger organizations such as the United Nations agencies, roles are clearly separated and functions defined, especially during humanitarian responses when large deployments of staff are made and each officer is responsible for specific duties.

The humanitarian logistics sector is also becoming increasingly professionalized and is learning

Case Study: Logistics During the Haiti Earthquake Crisis

Immediately following the earthquake, numerous challenges faced humanitarian workers bringing supplies into the country. The port was damaged and closed, so nothing could be imported by sea. The airport infrastructures were damaged (passenger terminal out of order and cargo facility heavily damaged); its control tower was nonfunctional for a number of hours until the U.S. military installed an emergency tower. The limited capacity of the national airport, linked to its single runway, resulted in a delay to absorb the amount of supplies that were needed and being planned. Moreover, this was happening during a phase that lacked coordination capacity to immediately direct the massive onslaught of assistance that followed the earthquake.

Thus, there were planes just hovering, circling the Port-au-Prince airspace awaiting clearance to land. Once the planes were allowed to land, other major problems were to obtain sufficient equipment and manpower just to unload the cargo. Warehouses were damaged. The lack of coordination during the first days, added to the reception of unsolicited donations, made it difficult to even know where to dispatch some of the arriving cargo. The airport remained for months the main entry point, given Port-au-Prince's port conditions, but some regional harbors were still functional and helped receive some of the incoming aid. This was useful in assisting the population relocated in the regions and assisted other affected towns such as Jacmel in the south of the island. In the north of the country, the port of the second largest city, Cap-Haitien, was also extensively utilized, together with Gonaives in the center.

However, the bulk of the cargo was diverted to the Dominican Republic, which played the role of hub for both air and sea shipping. Because of the congestion of Haitian infrastructures—insufficient even before the earthquake—organizations were constrained to utilize Dominican infrastructures (port and airports) to reach the island and then transship the cargo by road to Haiti. This was done mainly through the southern frontier entry point of Jimani/Malpasse, which was not ready to process this amount of incoming commodities, especially from an administrative point of view (customs processing). For a period, however, special rules were in place, partially lifting customs procedures, which helped speed up the entry into Haiti; however, after the customs "grace" period ended, further challenges were added to the Haitian relief operations.

Another challenge was finding a balance between the need for increased trucking capacity and the concern to engage local transporters and not further damage the local economy with the influx of Dominican transporters. At the same time, local transporters were not fully prepared to start again to execute humanitarian-community requests. This also led to the extensive use of military assets as a means of last resort. The already present United Nations DPKO Stabilisation Mission in Haiti (MINUSTAH) provided support, and the Haitian government provided direct assistance through its armies under the umbrella of the United Nations. Massive help was received from the U.S. Army, which reopened the airport with the deployment of a mobile control tower and worked hard at the port to temporarily rehabilitate it.

When cargo finally reached Port-au-Prince in Haiti, the next challenge was storing it in a safe and proper way; given the amount of commodities, the number of organizations, and the lack of structures because of earthquake damage, establishment of common storage facilities made sense. This action was led by the UN World Food Programme in its function of Logistics Cluster lead. It set up three different warehouse spaces, augmented with storage tents, to store a large part of the incoming commodities on behalf of the humanitarian organizations.

In this challenging environment where about a thousand nongovernmental organizations (NGOs) were working together, there was a critical need of coordination and information in every sector. In the logistics case, the Logistics Cluster WFP provided a constant flow of information regarding the context and the rules, changing almost daily, while at the same time also providing services (storage and transport) to the organizations that did not have enough internal resources.

The World Food Programme also set up the United Nations Humanitarian Air Service (UNHAS) in order to allow the movement of personnel between Santo Domingo and Haiti. Within Haiti, UNHAS also provided cargo helicopter services.

Common services provided also included a trucking bridge for four months between the Dominican Republic and Haiti and shipping services between Santo Domingo, Port-au-Prince, and some smaller Haitian harbors; a fleet of trucks shuttled between the two countries in order to ensure a continuous flow of relief items.

These services were offered free of charge to the responding humanitarian organizations.

In essence, the operation was challenging, as the response was mainly to be done in urban, densely populated areas on an island and with limited local resources and available logistics infrastructures. A challenge for many was to find enough resources to conduct their own operations. This is why coordination and information sharing have been paramount and why all types of available assets were exploited, from NGOs to the private sector to Dominican resources, and even the military.

much from the experience of private companies in term of techniques, systems, and accounting.

Other Logistics Considerations

There are several other logistics considerations, including customs and cargo tracking, pre-positioning stocks, use of military or civil defense assets, efficiency of response, passenger transport, humanitarian cargo and commodity-specific supply chains, and the logistics cluster.

Customs and cargo tracking: In addition to transport and storage, logistics deals with other issues necessary to guarantee a smooth delivery process. One of the most important phases is customs clearance, which in some cases might slow down the shipments and impact delivery of aid.

Customs clearance is the process that defines the set of actions necessary to legally enter merchandise into a country; this might include payment of fees, provision of specific certificates for some types of commodities such as medicines and food, and compliance with specific country rules. Rules vary significantly from country to country. Often, some rules are waived during emergencies, and international aid is often exempted from duties, but it is always necessary to demonstrate to national authorities that the cargo is humanitarian aid in order to avoid commercial cargo entering as humanitarian aid. Customs fees are one of the main sources of revenue for poor and middle-income countries, so customs fees exemption requests are analyzed carefully. By controlling the borders and accounting for what is coming in, countries can also know which commodities are available for the emergency response. Sometimes during large emergencies humanitarian agencies also support this tracking effort through the deployment of specific tracking systems that help provide an overview of the commodities available in a country during an emergency response. One such system is the LSS/Suma, initially developed by the World Health Organization (WHO) only for medicines and later used also for other types of commodities with the aim of avoiding supply gaps and improve planning and transparency.

With all its implications, the customs clearance process could entail delays in deliveries if not prepared and executed on time.

Pre-positioning stocks: Good planning of logistics actions, taking into consideration the processes identified above, is therefore paramount in order to have the right quantity of the necessary items available on time where necessary for the neediest beneficiaries of the humanitarian emergency relief operations. To be ready to deliver necessary aid at any moment, humanitarian organizations sometimes pre-position assets and commodities in strategic locations before emergencies can affect their distribution. For instance, to avoid the consequences of a road blockage during the rainy season in a region likely to be periodically cut off by rains, or if political turmoil is expected to affect accessibility to some cities, relief organizations can pre-position commodities in advance of a crisis.

Some large humanitarian organizations have adopted this strategy not only at the country level but also at the global level, with emergency stocks ready to be deployed for pre-positioning in strategic locations around the globe.

Use of military or civil defense assets: Humanitarian organizations extensively use private-sector resources that are contracted to move items where needed. However, deployment by their own means is necessary, especially for responses in conflict areas where an organization's visibility can offer protection to the convoys. During natural disasters, deployment via their own transport means that delivery can be faster and allow humanitarian organizations to be in the first line.

When commercial or their own means are not available, it is sometimes necessary to make use of military logistics. This is done more easily during natural disaster responses; during an armed conflict, collaboration can difficult to establish because the humanitarian principle of impartiality could be compromised.

Efficiency of logistics response: At the onset of an emergency, humanitarian logistics responses aim to deliver the needed commodities in the shortest time. During these phases, efficacy is the main concern, even though the cost efficiency will be negatively affected. In fact, logistics action might be expensive and use costly assets such as aircraft and helicopters. The trade-off between efficacy and efficiency is achieved by prioritizing life-saving interventions over cost efficiency.

Passenger transport: Traditionally, the main operational field of logistics is commodities transportation, even though it might, during some emergency responses, provide transportation to humanitarian workers needed for the implementation of the relief programs. For example, the interagency United Nations Humanitarian Air Service (UNHAS) is deployed by the United Nations World Food Programme on behalf of the humanitarian community. UNHAS transports both cargo and passengers to the affected areas, enabling humanitarian workers to be deployed quickly and safely.

Humanitarian cargo and commodity-specific supply chains: "Humanitarian cargo" defines the whole spectrum of products (food and nonfood items) needed to be delivered to assist affected populations in different fields of intervention, such as health, water and sanitation, and shelter.

These products differ in size, handling, and fragility, and each sector has its logistics needs to be taken into consideration when planning operations. Special care is normally given to medical items; medical logistics is a specialized branch of humanitarian logistics. For instance, setting up a cold chain delivery system for vaccines in conflict zones or during natural disaster response and at the same time respecting medical safety standards represents a challenge for logisticians that needs to be faced and won.

Logistics cluster: As with the other sectors of humanitarian interventions (e.g., WASH, health, food security, camp coordination camp management, education, agriculture), logistics has an extreme need of coordinating its action and sharing logistics-related information. The logistics cluster is the entity responsible for this kind of support during emergencies when the cluster approach is endorsed by the humanitarian coordinator. The logistics cluster lead agency is the World Food Programme (WFP), which on behalf of the humanitarian community provides the needed coordination and information sharing, including cartography. In case of extreme needs, where recognized gaps are present, the cluster lead agency for logistics, the WFP, on top of the coordination and information-sharing role, has the mandate to cover those gaps with the provision of common services.

Consequences of Logistics Failure

The failure of logistics planning or simply bad planning and delay could result not only in the waste of resources and efficiency, but ultimately in the loss of human life. Coordination and prioritization of logistics activities should always be taken into account by decision makers during the first phases of an emergency. A logistics setup is often drawn during the initial days of a response; the initial decisions are then paramount for ensuring that an adequate supply chain is able to reach the population in need.

Failure to do so could endanger the survival of a large part of the affected population. Good planning, resource mobilization, and advocacy with donors and decision makers on logistics could mitigate risks and ensure proper logistics support to relief operations.

Wider Crisis Management Process

In the frame of crisis management as a whole—not just response, which remains the primary logistics challenge—logistics considerations should be especially taken into account during the contingency preparedness phase. If emergency response plans for particular at-risk areas or countries are drafted, a logistics setup of the area should be analyzed, with plans discussed and agreed upon between local authorities and organizations already working in the crisis area in order to grant rapid deployment of the emergency supply chain in case of emergency. Lessons learned should be also compiled after each logistics relief operation in order to facilitate better planning of future responses in similar contexts. Logistics planning allows tangible help reach the affected beneficiaries in the crisis area; therefore, it remains a fundamental discipline of crisis management, and the issues related to it should always be given the proper emphasis during the planning and response phases.

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See Also: Border Disputes; Cluster; Commodity Shortages; Contingency Planning; Coordination; Coping Capacity and Response Capability; Critical Infrastructure; Earthquakes; Nongovernmental Organizations; Office for the Coordination of Humanitarian Affairs (OCHA), UN; Peacekeeping; Preparedness; Response; Transportation Security.

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Looting

Looting is the very public theft of private property, usually when the owner is unable to protect it and normal policing functions are ineffective. On occasion, warfare, civil disturbances, and natural disasters have all led to the breakdown of law and order to the extent that looting has become a risk or a reality. Looters sometimes operate singly, but more often they act in response to abrupt changes in social norms caused by interaction between people who perceive an opportunity for gain or uninhibited acts of vandalism. The risk that looting will break out is apparently greater at night (under the cover of darkness) and in areas of socioeconomic deprivation, where some of the inhabitants are disaffected, are alienated, or do not feel that they have a very strong stake in the normal workings of society.

Although looting is much feared, it is actually often one of the “myths” of disaster, albeit a very contentious one. It has been misidentified or greatly exaggerated in many emergencies. Moreover, it is often expected to be a strong element of situations in which, in reality, it is unlikely to be a significant factor. It is usually treated as symptomatic of anarchy, the destructive side of the human character, and the degradation or spontaneous abandonment of social norms. Although looting is refreshingly absent from many disasters, or at least is scarcely important in comparison with positive behavior, it remains a factor in some events and, after years of study, it still demands further clarification.

Early Sociological Models of Looting

In 1968, sociologists Enrico (Henry) Quarantelli and Russell Dynes recognized that there is a difference between the causes and patterns of looting in disasters and civil disturbances. Over the following two years, they elaborated models of looting with particular reference to situations in which it has been prevalent, most of which were riots and few of which were natural disasters. Indeed, with regard to the latter, there probably have to be specific preconditions of instability in the social fabric for looting to be a factor at all. Thus, after the 1999 earthquake in the city of Armenia, Colombia, residents looted food stores and supermarkets. This was both a protest at the inefficiency of the Colombian government's relief effort and a move to satisfy a basic need for sustenance. It was not a set of random acts of vandalism. Moreover, it probably stemmed from preexisting instabilities in society, such as lack of faith in the role of government as the true and responsive embodiment of the common will. Similarly, although looting was reported to be widespread after Hurricane Katrina struck New Orleans in late August 2005, a significant proportion of it turned out to be foraging for basic supplies of food and water when nothing was forthcoming from relief agencies.

According to Quarantelli and Dynes, looting in disasters tends to be stealthy (although it clearly was nothing of the kind in the Colombian city of Armenia). In civil disturbances, it tends to follow a more open and complex model. In this, the first stage is marked by attacks on symbols of authority, and there then follows the mass redefinition of property rights. The looting that occurs after this is a collective, participatory action in which pillaging tends to be more important than acquisition of goods: property norms are in the process of being redefined.

Further work by Dynes and Quarantelli broadened the model of looting into three stages, in which the first is largely symbolic, the second is systematic and organized, and the third is a free-for-all. The middle stage involves cooperation between those elements of society who wish to profit from the anarchy by organizing theft and those who are doing it for the thrill. In the third stage, plundering becomes an acceptable, if transient, social norm.

Interestingly, Quarantelli and Dynes found that there is no simple correlation between the level of poverty or disadvantage of a person and his or her propensity to engage in looting. Research in the 1990s even went so far as to suggest that looters tend to be relatively well educated and adept at communication. Moreover, there appeared to be no discernible differences in the average profiles of people who do and do not take part in rioting and looting. However, an analysis of social conditions associated with the widespread looting in English cities during the summer of 2011 showed that a distinct correlation existed between areas of socioeconomic deprivation and places where looting was most severe. It appears that some people are simply drawn into looting by social pressures, imitative behavior, the desire to transgress, or a thirst for novelty, but people who by poverty or deprivation are disconnected from mainstream society may feel that they have less to lose if they engage in looting.

A doorway of a jewelry shop in L'Aquila, central Italy, lies smashed on the street from looters after the April 6, 2009, earthquake. As rescuers dug through the rubble, other looters were caught raiding abandoned homes nearby.

Developments in Criminology

Research conducted in the 1990s by sociologists and criminologists came up with new models. In a rather complex manner, these broke down the context of riots into the physical situation, the tactical conditions, any pre-history of similar incidents, prevailing social relationships, the local culture of norms and expectations, the political context of previous conflict, and the structural distribution of political power. New use was made of Philip Zimbardo's theory of "deindividuation," in which individual responsibility for one's actions disappears amid impulsive mass behavior results from crowd dynamics, which negate people's self-control. It was noted that arousal is an important precondition for deindividuation to emerge. Whereas deindividuation is characterized by uninhibited behavior, strategic interaction theory suggests that a person's payoffs depend on what other people do at the scene, which can change a person's estimate of the costs and benefits of participating in a looting spree. In dynamic terms, emergent norm theory suggests that crowds adapt quickly to changing circumstances, and their members conform to the developing trend of mass behavior. The occurrence of imitative riots and looting has been seen as a communication process termed *chronic contagion*.

In all of this research, there are several points to bear in mind. The first is that natural disasters and civil disturbances such as riots tend not to generate the same kinds and scales of looting—indeed, the former might not generate any at all, and what occurs tends to be overshadowed by, or even (paradoxically) linked to, Alan Barton's "therapeutic community," society in disaster as a force for solidarity and consensus on healthy social norms. The second is that theories of rioting and looting can be divided into those based on association and communication and those that require dissociation of the participants and a greater level of spontaneity. The third point is that looting can be purposeful or aimless. In disasters and riots that are a response to specific grievances, the purposeful kind dominates, that is, looters want to make a point to the authorities. Aimless looting confirms research that suggests that the circumstances and dynamics of riots are not linearly related. In synthesis, it seems that the likelihood, occurrence, and severity of either riots or looting cannot be predicted from levels of social deprivation. Hence, it is not easy to apply sociological analysis to situations dominated by social tension.

Management of Looting

Police forces tend to use four strategies to discourage looting. Where possible, an area at risk can be declared off limits and cordoned, with the presence of uniformed officers at roadblocks and surveillance within the cordon. If this cannot be achieved, actual or potential looters can be contained, detained, or dispersed. If there is a large number of people involved, this may require riot police with protective gear and the ability to manage significant numbers of arrests. Surveillance camera work and identification of ringleaders can help focus the official response and provide evidence for subsequent prosecution. At the same time, efforts must be made to protect members of the other emergency services, such as firefighters and ambulance personnel, to ensure that they do not become the victims of violence and civil unrest. Right or wrong, police tactics during riots and episodes of looting come in for heavy criticism from the public, especially where crisis situations are politically charged or sensitive. However, the victims of looting are often the inhabitants of the zones that generate the unrest, which are commonly areas of relative or absolute social deprivation. The destruction caused by looting and the heavy-handed official response thus tend to reinforce the status quo rather than lead to social transformation.

Hard Lessons From the Field

Rioting and looting occurred widely throughout England in early August 2011. The official response was seen by the general (non-rioting) public to be inadequate and to have let a bad situation degenerate into the uncontrolled proliferation of violence and anarchy. Suddenly, the underclass shed their mantle of invisibility and rose up in arms, as they had done in Detroit and the Watts neighborhood of Los Angeles. In terms of emergency management, there may have been a failure to create adequate planning scenarios based on similar events in the past and in other places, notably in Paris in October and November 2005. Similar inadequacies can be seen in the response to the bombing and shooting spree carried out in Norway on July 22, 2011, by Anders Behring Breivik.

It is important not to overstate the effects of the English case. In the Detroit race riots of 1967, some 2,700 shops were looted, far more than in England in 2011. However, the images and accounts of immoral and criminal behavior in the latter case were striking. Moreover, the dilemmas of crowd control were all too apparent in the operational shortcomings of the forces of order, another common aspect of looting sprees. Despite the spontaneous appeal of looting to a wide social spectrum, it is clearly more likely in places where the social compact has been replaced with a widening gap in wealth and opportunities between successful people and those at the bottom of the pyramid.

Looting and the Therapeutic Community

The social study of disaster has been predicated for decades on the assumption, indeed the affirmation, of the "therapeutic community," in which destructive individualism is replaced, or at least overshadowed, by a consensus-based form of solidarity and self-sacrifice for the common good. Models based on the breakdown of society have been labeled "Hollywood myths." In the vast majority of cases, the social fabric is strong enough not to break down as a result of social unrest (unless there are deep political reasons why revolution is possible). However, it is as well to remember that society has its darker side. The moral consensus generated by floods and earthquakes, for example, is not necessarily as deep as social scientists have tended to assume. Criminal activity does not cease because there is a disaster, a crisis, or the emergence of a "therapeutic community": indeed, in the long run, criminals tend to see disasters as a source of opportunity for their activities. The truth of the matter can only be arrived at if we pay more attention to the *context* of events.

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See Also: Buildings; Business Continuity Planning; Groupthink; News Media; Normalization of Deviance; Panic, Nature and Conditions of; Poverty; Religious Violence; Riots; Sabotage.

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Losses, Quantitative Versus Qualitative

Crises, irrespective of the actual underlying causal agent, impact society by causing deaths, injuries, and fiscal damage to property, crops, and ecosystems, and a variety of other less obvious impacts to humans and the human use system. Although it is extremely difficult to count the total value of all things impacted by a particular crisis event because of issues related to insured versus uninsured losses, direct versus indirect damages, and victim primacy, there are means by which society can evaluate the totality of an event's impact on a place or a population—from both qualitative (empirical) and quantitative (abstractive) perspectives.

Advanced counting, measuring, and valuation techniques are in place to appraise monetary impact, job loss, slowdowns in tourism, and even ecosystem decline related to harvesting of seafood, plants, or animal husbandry—to name a few impacts of crisis. Nearly impossible to capture in any way that can be accurately or adequately counted, summed up, or absolutely accounted for in a timely manner are a host of crisis losses related to incidents of political, financial, or reputational crisis that can best be understood using conjectural or notional techniques. The true loss or impact associated with a crisis in any of these examples may not be immediately apparent or may never amount to any measurable outcome.

Reputational crisis is often the most difficult of these because although an incident is seemingly insignificant from a financial standpoint, it could have a devastating, yet not completely measurable, impact on an entity's reputation. Because crisis loss can take on a variety of meanings—all dependent on point of view—it is important to define and describe the procedures and methods in place for capturing and measuring these losses. Generally, human interest in losses is intrinsically woven into the larger human use system, namely, if something is damaged to an extent that it impacts lives and livelihoods, the "loss" is more tangible than something else that may have been damaged but cannot be quantified, such as the loss of a species of native plant, the loss of a view of the landscape, the loss of a human life, or wear and tear of an individual's body that is not immediately apparent or identifiable. Beyond a simple count of these "invaluable" asset impacts, we have very limited means by which to calculate these types of societal, political, ecologic, economic, physiologic, or reputational losses across the board. The area of crisis loss metrics, methods, and measurement has continued the conceptualization and use of quantification and qualification techniques. Lessons learned and processes used in crisis loss accounting practices also provide an accountability starting point for many other crisis event categories.

Measuring and Recording Crisis Losses

Direct crisis losses generally include impacts to public infrastructure, buildings, crops, and machinery. Here, an accounting of replacement costs can simply be used as a surrogate value of direct loss from a disaster causing catastrophic damage. The term *indirect losses* is used more freely to describe losses to the human use system that are not immediately realized and accounted for under the direct loss category. Included here are concepts such as jobs and revenue loss from business closures or delayed recovery; destruction of landmarks and cultural heritage locations; loss of family heirlooms, photos, or documents that are irreplaceable; and more subtle impacts to health and well-being such as post-event trauma or stress.

Empirically based quantitative methods and strategies are in place to account for most historical losses (both direct and indirect) from crisis events. However, a whole host of losses is either underrepresented or wholly overlooked by utilizing only quantitative approaches. Additional strategies, techniques, and methods are needed to fully account for the totality of losses from any given event. For example, although society may be able to partially determine the value of a life in terms of lost wages through the use of cost-benefit analysis, it does not capture the true and complete value of an individual, nor does it account for psychosocial impacts that may lead to losses in the future. Unfortunately, lives are still being lost within the context of crisis, but generally the number of lives lost annually to crises has been steadily declining over the past century. Conversely, damage to property and crops as well as massive population displacements continue to be an ever-increasing result of crises across the globe.

Losses From the Quantitative Perspective

Numerous entities around the world track crisis losses using many different measures, metrics, and spatial scales (see Table 1). In some instances, losses are recorded at the country scale of geography and may include such data as injuries, fatalities, evacuations, and displaced populations. Data collected at this scale are useful for comparing one country's pattern of loss to that of another county. Other institutions gather much more highly detailed information at much smaller scales and for much shorter time frames. Unfortunately, along with the creation of each crisis loss data set is a set of inherent or incurrent biases regarding the completeness and suitability of loss data. Six major disaster loss data set biases that systematically introduce skew into interpretations of loss information have been exposed and explored by the research community. Included in these are (1) accounting bias: that all loss types (direct and indirect, insured and uninsured, injuries and deaths, displacements and relocations) are included; (2) geographic bias: that hazard losses are comparable between places and at different scales; (3) hazard bias: that every disaster/hazard type is represented within known and accessible loss estimations; (4) systematic bias: that all loss data sets contain the same type of loss data; (5) temporal bias: that losses are comparable from one time period to another; and (6) threshold bias: that all losses are counted in every data set, regardless of event size, intensity, or magnitude.

Table 1 National and global loss databases, providers, and URLs

Loss database	Database provider and URL
Asian Disaster Reduction Center	Asian Disaster Reduction Center: www.glidenumber.net
Hot spots	Center for Hazards Risk Research: http://www.ldeo.columbia.edu/chrr/research/hotspots
SHELDUS	USC Hazards and Vulnerability Research Institute: www.sheldus.org
EM-DAT	Centre for Research on the Epidemiology of Disaster: http://www.emdat.be
Global Active Archive of Large Flood Events	Dartmouth Flood Observatory, Dartmouth College: http://www.dartmouth.edu/~floods/DataProducts/ExtremeFloods/index.html
Disaster Database Project	Walter G. Green, University of Richmond: http://learning.richmond.edu/disaster/index.cfm
NatCat SERVICE	Munich Re: http://www.munichre.com/en/reinsurance/business/non-life/georisks/natcatservice/default.aspx
NATHAN	Munich Re: http://www.munichre.com/de/reinsurance/business/non-life/georisks/nathan/default.aspx
Extreme Weather Sourcebook	National Center for Atmospheric Research: http://www.sip.ucar.edu/sourcebook
PERI presidential disaster declarations	Public Entity Risk Institute and University of Delaware: http://www.peripresdecusa.org/mainframe.htm
Canadian disaster database	The Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP): http://www.publicsafety.gc.ca/prg/em/cdd/index-eng.aspx
Earthquake database	U.S. Geological Survey: http://earthquake.usgs.gov/earthquakes/eqarchives/epic and http://earthquake.usgs.gov/earthquakes/eqarchives
Storm events database	U.S. National Climatic Data Center: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storm
Storm data	U.S. National Climatic Data Center: http://www.ncdc.noaa.gov/oa/climate/sd
Severe weather database files	U.S. National Climatic Data Center: http://www.spc.noaa.gov/wcm
Policy and claim statistics for flood insurance	U.S. National Flood Insurance Program: http://www.fema.gov/business/nfip/statistics/pcstat.shtm
Historical tsunami database	U.S. National Geophysical Data Center: http://www.ngdc.noaa.gov/hazard/tsu_db.shtml
The Significant Earthquake Database	U.S. National Geophysical Data Center: http://www.ngdc.noaa.gov/nndc/struts/form?t=101650&s=1&d=1
The Significant Volcanic Eruption Database	U.S. National Geophysical Data Center: http://www.ngdc.noaa.gov/nndc/servlet/ShowDatasets?dataset=102557&search_look=50&display_look=50
Annual summaries of North Atlantic storms	National Hurricane Center: http://www.aoml.noaa.gov/general/lib/lib1/nhclib/mwreviews/mwreviews.html#top
Natural hazard statistics	National Weather Service: http://www.nws.noaa.gov/om/hazstats.shtml

Use of standardized, centralized, and codified data sets does provide society with some means of counting and measuring losses across space, time, and causal agent, but a glance at Table 1 also highlights a few facts about the quality and spatial nature of this "best available" and mainly quantitative data. Many of the data currently collected are focused not at the global scale but instead

Case Study: Losses Associated With the 2010 Tohoku Earthquake and Tsunami

A prime example of the difference between quantitative and qualitative losses in regard to disasters and crisis is the true and complete impact of the 2010 Japanese earthquake that quickly escalated into an unimaginable cascading catastrophe, including tsunami, nuclear release, sickness, homelessness, job loss, and environmental decimation. This example provides a basis for exploring both quantitative and qualitative aspects of disaster loss accounting where different definitions of direct and indirect loss play a crucial role in deciphering lists, counts, stories, and reports. Additionally, this disaster brings to light the importance of understanding what is considered a hazard-related loss and how this consideration confounds a clear-cut arrival at a precise loss figure.

The 2011 earthquake off the Pacific coast of Japan was a magnitude 9.0 undersea megathrust earthquake that shifted Japan nearly 2 meters and altered the general rotation of the earth as a whole. This compound disaster created immeasurable impacts the world over. Counts of immediate losses from the earthquake and subsequent 40-meter tsunami include nearly 16,000 deaths, more than 27,000 injuries, damage or destruction of more than 1 million buildings, and estimates of displaced populations greater than 300,000. Subsequent nuclear reactor leaks, loss of manufacturing, and transportation, and labor shortages, coupled with immeasurable (to date) environmental impacts, have created global impact ripples that are responsible for many less easily measured losses far from the epicenter of the earthquake. This type of cascading effect is not uncommon with large-scale disasters but does pose a problem for those interested in a purely empirical accounting of the impacts of disaster. Buildings, infrastructure, fatalities, and injuries are among the more readily accounted for disaster impacts. Additionally, global trading, manufacturing, and business losses can be tallied at the end of the month, quarter, or year and attributed to system shocks such as those felt by the Tohoku earthquake and tsunami. However, this disaster does provide the basis from which to discuss in greater detail one type of loss that is not quantifiable using hard data but can be more easily understood from a qualitative perspective.

A seeming stretch of the facts, yet an undeniable truth, is that anyone in the market for an Apple iPad 2 during the time immediately following the earthquake and tsunami suffered a disaster-related loss. Although this loss is not calculable using any known equations, the timeline, trajectory, and broad human-related impacts of this shortage will be hotly debated for years in both economics and medical classrooms for years to come. Although loss of production time for the manufacture of key components required in building the tablet, missed transportation costs, and even loss of productivity by the end user who did not receive the "product" on time can be calculated using known equations, there are a host of other insidious earthquake and tsunami impacts that will remain forever uncountable and empirically unknowable. These losses include second-, third-, and fourth-level victim impacts—myriad psychosocial impacts related to disaster. This notion of allostatic load, or the wear and tear on the body resulting from undue stress or insufficient management of stress, creates a host of impacts far outside the immediate earthquake and tsunami impact area that are insidious, not easily tracked, and possibly never combined in such a way as to ever be traced back to the true causal agent. These qualitative impacts from disasters continue to go unnoticed across a much broader area and are often not be measurable until they reach a critical toxic mass, yet they represent a very real and uniquely unaccountable aspect of disaster losses.

tuned in to only those disasters occurring in more developed areas of the world. In fact, only those data sets that are created automatically using monitors, sensors, or other remote data collection devices (U.S. Geological Survey [USGS] earthquake monitors) have spatial coverage across the globe. Additionally confounding is the fact that most of these data sets focus on dollar losses as the sole means for understanding impacts. This is problematic because in many cases, developing countries have lower economic losses and higher human impact related to disasters, while the opposite is generally true for developed countries. Data sets that only focus on the quantity of losses at the expense of misrepresenting or leaving out entirely quality of losses incurred from disaster can be misleading and not truly representative of the reality of crisis. Furthermore, data quality and the biases discussed above are inherent and potentially rampant across the entire list of data sets here and any other disaster-related loss data in existence.

Losses From the Qualitative Perspective

Capturing the true impact of crisis events, including an accounting of all damages and an accurate number of people who were lost, should not be a difficult exercise—especially in most developed countries, where routine collection of population and housing information takes place. Although the visible impacts such as damages to structures and the extended (indirect) impacts are more routinely and systematically understood using qualitative approaches, many aspects of loss are often less fully understood. Death tolls from most major disaster events tend to follow a curve over time wherein initial reports from the field indicate low fatalities; followed by a sharp increase in reported, suspected, and identified mortality statistics; and finally by a moderation of the total deaths where unaccounted-for persons slowly turn up in shelters far away or are otherwise removed from the list of those missing and presumed dead. Although quantifiable, this trend in deaths is often an incomplete accounting of the total impact of the event itself—one in need of additional (often immeasurable) existential information, including health impacts that are not immediate and perhaps never fully revealed within the common "recovery" timeline.

Assessing loss from a qualitative perspective typically employs a more contextual approach where the root causes of crisis are often explored. This necessitates an in-depth analysis of the social, political, economic, and health characteristics of a community in which attributes of impacted individuals and places are analyzed in context with the physical event that intersected with society and resulted in a disaster. Because of the detail required to perform this type of research and the unique circumstances that arise in various communities, findings from qualitative studies of disaster losses are often difficult to generalize or aggregate and are nearly impossible to extend to other places. Examples of the focus of qualitative loss studies include examining the value of a specific scenic view damaged or destroyed by disaster, the stigmatization of a vacation locale because of sensationalized news coverage, and quality of life or livability constructs such as societal or individual well-being. Although indexes have been created and numbers have been applied to these concepts, they cannot be adequately or accurately measured using scales, composites, or hard numbers. Rather, insight and understanding related to these less tangible disaster effects can be achieved by cataloging anecdotal references, victim perceptions, and other tangential information. Such information provides a deeper understanding of disaster impacts at the neighborhood or place level but is often neither applicable at a larger scale nor transferable to other similar smaller areas within a disaster impact zone.

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See Also: Business Impact Analysis; Cascading Crisis; Catastrophe, Definition of; Critical Infrastructure; Damage Assessment; Earthquakes; EM-DAT; Evacuation; Floods; Hurricanes, Typhoons, and Cyclones; Insurance; NatCatSERVICE (Munich Re); Reinsurance; Reputational Risk; Sigma (Swiss Re).

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Malaria

Malaria is an infectious disease that requires a parasite, a vector, and a host. In humans (hosts), malaria is a vector-borne protozoal infection caused by *Plasmodium* parasites and transmitted by female *Anopheles* mosquitoes (vector). In 2010, worldwide cases of malaria were estimated at 250 million, with around a million deaths. Africa accounts for over 90 percent of the mortality. Malaria is endemic in parts of Africa, Asia, the Americas (Central and South), and specific Caribbean islands.

Classification

The Centers for Disease Control and Prevention (CDC) classifies malaria as a biosafety level three—it is considered a serious or potentially deadly disease requiring specific safety equipment and procedures. Malaria is listed as ICD-9 084. Malaria is caused by five *Plasmodium* species, which include *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, *Plasmodium ovale*, and *Plasmodium knowlesi* (monkey malaria, rare in humans). *Plasmodium falciparum* is the most severe and lethal of the species, while *Plasmodium vivax*, *Plasmodium malariae*, and *Plasmodium ovale* cause mild disease and rarely death. The most common species are *P. falciparum* and *P. vivax*.

Transmission and Incubation

Malaria is principally transmitted by bites from female *Anopheles* mosquitoes. There are more than 480 species of *Anopheles*, and every continent, except Antarctica, has at least one species. Approximately 100 of the *Anopheles* mosquitoes are able to transmit malaria, but only about 40 commonly do. *Anopheles gambiae,* which lives mostly in sub-Saharan Africa, is the best known mosquito that transmits the parasite *P. falciparum*, which causes severe illness in humans.

Anopheles species need a blood meal from a vertebrate to nourish their offspring. The preferred meal is from humans (anthropophily) or animals (zoophily). *Anopheles* mosquitoes that are anthropophilic, such as *A. gambiae* and *A. funestus*, are better able to transmit the malaria parasites from human to human. *Anopheles* mosquitoes also feed indoors (endophagic) and at night (nocturnal) between 11 P.M. and 2 A.M., with peak feeding time being around midnight. Because the vector is a mosquito, the transmission is contingent on conditions being favorable for the mosquito, which are adequate rainfall, temperature, and humidity.

Transmission of the malaria parasite from the mosquito (vector) to human (host) and vice versa is necessary for the complicated life cycle of the parasite. All five *Plasmodium* species have a similar life cycle, with slight variation. For example, an infected female *Anopheles* mosquito injects

IRS
Indoor Residual Spraying
Zanzibar
KATAA MALARIA
USAID
ZMCP

Trained fumigators prepare to spray for mosquitoes house-to-house in Zanzibar in Tanzania, July 9, 2006. The campaign to control malaria, which included the distribution of long-lasting, insecticide-treated bed nets, continued into 2007. After the treatment, data gathered from health facility laboratories and pediatric wards showed a 95 percent reduction in malaria infections throughout the country for children under 2 years of age. A community survey in May 2007 found no malaria cases among pregnant Zanzibari women.

Plasmodium sp. sporozoites into a human while feeding on them, which travel to the liver, attack liver cells, undergo asexual reproduction, and develop into schizonts. These schizonts mature after about 5 to 15 days and release thousands of merozoites, which exit the liver and enter the bloodstream. The merozoites attack red blood cells (RBCs) and undergo a second asexual reproduction stage, and after maturing, the infected RBCs (after 1–3 days) rupture repeatedly, causing more merozoites to be released into the bloodstream, which causes another asexual reproduction and multiplication. Some of the merozoites discontinue replicating and develop into gametocytes (i.e., sexual forms [male and female] of the parasite) and circulate in the bloodstream. When a mosquito feeds on an infected human, it takes in the blood meal (needed for reproduction) and the gametocytes. The gametocytes travel to the mosquito gut, where the human blood cells rupture, releasing the gametocytes, and they become male and female gametes. These gametes combine into diploid zygotes and develop into ookinetes. The ookinetes embed into the midgut of the mosquito and become oocytes and produce thousands of sporozoites; after 8 to 15 days, they mature and rupture, releasing the *Plasmodium sp*. sporozoites into her body cavity, where they travel to her salivary glands. The female mosquito can inject into a human or restart the parasites' life cycle.

There are three other modes of transmission for malaria: congenital (i.e., the parasitized RBCs pass across the placenta in utero or cross during labor), transfusion, and infected needle. Congenital malaria is more common during a first pregnancy. Transfusion malaria occurs when an infected donor's blood is transfused to another person. It is difficult to identify a malaria infection in blood, and as a result, it is one of the most common transfusion-transmitted infections. Infected needle malaria occurs by accidents (needle stick) and by reusing needles, such as by health care staff or by IV drug users.

The incubation period is from a sporozoite infection to appearance of symptoms. The incubation period varies, based on the infective parasite, such as *P. falciparum*, 9 to 14 days; *P. malariae*, 18 to 40 days; *P. knowlesi*, 11 to 12 days; and *P. vivax* and *P. ovale*, 12 to 18 days. Some temperate region *P. vivax* strains have an incubation period of 6 to 12 months (180–365 days). Incubation periods can be prolonged if a person is taking chemoprophylaxis (using antimalarial drugs) or has limited immunity from a previous parasite infection.

Symptoms

Those with partial immunity can be asymptomatic. Commonly, symptoms appear after seven days, but the time can be as long as eight to 10 months, as with *P. vivax*, and even longer for *P. ovale*. Usual symptoms of malaria are malaise, loss of appetite, fatigue, fever (over 100 degrees F [38 degrees C]), chills, headache, muscle pain (myalgia), joint pain (arthralgia), and dry cough. Some patients experience emesis (vomiting), nausea, diarrhea, and stomach pains (mainly in children). A malaria infection runs a repeated cycle of coldness, followed by fever, then bouts of sweating lasting four to six hours, which occur every 48 hours with *P. vivax* and *P. ovale* infection, every 72 hours with *P. malariae*, and every 36 to 48 hours with *P. falciparum*. The repeated cycle is an indicator of being infected with malaria and corresponds with the parasites' life cycle as they develop and rupture cells in the liver and RBCs.

Untreated malaria can cause serious complications, especially *P. falciparum* malaria. Severe complications of *P. falciparum* include cerebral malaria (coma or seizures), severe anemia, acidosis, acute respiratory distress syndrome, hypoglycemia, spontaneous bleeding, haemoglobinuria (hemoglobin in the urine), renal failure, jaundice, enlarged liver (hepatomegaly), enlarged spleen (splenomegaly), and clogging of the capillaries, which can cut off blood to the brain (cerebral ischemia) or other essential organs and possibly result in death. Severe cases of malaria can progress quickly and result in death within hours or a few days, especially for the risk groups of young children (children under 5 years old are especially vulnerable, with the highest mortality being those younger than 2 years old), pregnant women, people with HIV/AIDS, and nonimmune international travelers.

Diagnosis and Treatment

Because a malaria illness progresses fast, it is important to diagnosis and treat the condition early in order to reduce the spread and prevent death. Malaria diagnosis is confirmed within a few minutes by detecting the malaria parasites in human blood with a microscopic examination, test strips that confirm antigen is present (rapid diagnostic tests), and an immunochromatographic test. A confirmed diagnosis is necessary before providing treatment.

Treatment options vary based on *Plasmodium* species infection, the severity of symptoms, the person's age, and whether the person is pregnant. The objective of treatment is threefold: (1) reduce symptoms, (2) prevent relapse, and (3) limit spread. Medications used to attack the schizont of the malaria parasite include chloroquine, quinine sulfate, and artemisinin combinations. Treatments to reduce symptoms are a combination therapy of blood schizonticidal medications (e.g., attack/kill the schizonts), such as chloroquine, quinine sulfate, and artemisinin. To prevent relapses of *P. vivax* and *P. ovale*, a schizonticidal medication called primaquine is used to kill parasites residing in the liver. Gametocytocidal medications are used to prevent spread by killing the gametocysts; these include primaquine (for *P. falciparum*) and chloroquine for all other parasite species. In certain areas, such as select areas of Africa, the *Plasmodium sp*. are becoming resistant to antimalarial drugs.

Prevention and Management

There is currently no vaccine available for malaria, and no antimalarial drug is 100 percent effective. Malaria prevention consists of a combination of chemoprophylaxis and mosquito avoidance measures. Mosquito avoidance measures include a combination of vector control measures, such as eliminating breeding grounds to prevent larvae development and regular indoor spraying of a residual insecticide containing pyrethroid. Other avoidance measures are wearing protective clothes and using an insect repellant, such as DEET (diethyltoluamide) during *Anopheles* mosquito feeding times. Using insecticide-treated mosquito bed nets is another avoidance measure. In some areas of Africa, mosquitoes are becoming resistant to the insecticides with pyrethroid. The introduction of malaria into overcrowding situations such as evacuation centers or refugee camps after an emergency and/or disaster greatly increases the risk of infection and a possible epidemic. Distribution of treatment should be prioritized for risk groups of young children and pregnant women.

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See Also: Epidemics; Infestations, Parasite; Public Health Surveillance; Vulnerability.

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Manufacturing Risks

There are risks associated with the infrastructure of a manufacturing facility and from external sources. Manufacturing can be defined as the process of taking raw materials and creating finished products. These products range from milled parts to printed circuit assemblies, textiles, or chemicals.

Manufacturing of products and goods is typically a large portion of the gross domestic product of industrialized nations. For instance, the chemical manufacturing and production industry in the United States represents approximately 10 percent of the gross domestic product.

Risks in the manufacturing domain have increased since the Industrial Revolution. Innovations in technology and science have created modernized processes that have increased risk.

"Manufacturing risk" can be defined as an increase of the potential of loss that is created by the modernization process, particularly by innovative developments in science and technology. As the level of risk increases, processes within the manufacturing site become more hazardous. When the hazard threshold is surpassed, an incident occurs that leads to a loss.

Manufacturing risk is influenced by the technology utilized during the production process. Task preparedness, environmental conditions, and well-defined policies and procedures influence the level of risk within an enterprise.

Quantifying Manufacturing Risk

Manufacturing risk needs to be quantified, both internal and external to an enterprise. How are risks identified and quantified? There are a number of methodologies used in industry, including the following:

- Failure mode and effects analysis (FMEA)
- Failure mode effects and critical analysis (FMECA)
- Hazard and operability study (HAZOP)
- Hazard analysis and critical control points
- Fault tree analysis (FTA)
- Six Sigma analysis
- Forensic engineering

Enterprises must also be cognizant of insider threats, which could be disruptive to operations and increase risk. The U.S. Department of Defense (DoD) report "DoD Instruction 5000.02" establishes guidelines and procedures for understanding manufacturing risk in military systems. The government creates Technology Readiness Levels as a tool to conduct technical assessments and quantify technology maturity and risk. The use of Mission Readiness Levels (MRLs) to "assess manufacturing readiness can foster better decision making, program planning and program execution through improved understanding and management of manufacturing risk."

DoDI 5000.02 requires programs to assess manufacturing risk early in the design process.

The government does not specific guidance in 5000.02 on how these assessments should be accomplished. The DoD and a number of companies are using MRLs as a best practice and are incorporating MRL assessments into technical reviews and audits.

In addition to risks involved with the manufacturing process, there are external factors that could increase the level of risk. For instance, natural disasters, cyber crime, fire, and terrorism could increase the level of risk in an enterprise. Vulnerability and threat assessments and hazard analyses are used by corporations to identify potential external risks. These analyses lead to the development of business continuity plans, continuity of operations plans, or continuity of government plans.

The chemical industry is guided by federal rules and regulations and corporate policy in regard to protecting facilities. Industry best practices for response to unplanned chemical releases are not widely publicized. S. Fortier and J. Volk found the following:

> The threat of terrorism has expanded the definition of critical infrastructure protection and response. The government as well as private enterprises must be aware of the threats and prepare themselves to protect their critical assets. The definition of "what is a critical asset" is also being reevaluated. Society has seen new threat modes, such as the 9/11 incident, improvised explosive devices and suicide bombings, that require much better planning to prevent these types of incidents. The consequences of these new types of attacks have to be planned for so that the response mechanism is effective and efficient. Emergency and disaster preparedness planning is an evolving field of study. Mechanisms such as continuity of operations planning (COOP), indication and warning systems, and vulnerability assessments are used to plan for emergencies or disasters and identify the potential weaknesses in enterprise assets (such as policies, physical assets, personnel, procedures and methods). The government and the private sector have the requirement to protect its critical infrastructure. There are critical operations that need to operate uninterrupted, such as banking, telecommunications, the power grid or military operations. Threat models are used by the federal government and private industry to analyze, and prepare for, possible threats to critical infrastructure.

Although considerable research has been conducted in the area of emergency preparedness and protection of critical infrastructure, this research into emergency response mechanisms has not been fully explored by the chemical-producing industry. Fortier and Volk found that:

> The risk of having critical systems taken off line requires an enterprise to make a substantial investment to protect itself from various threats. In many industries, these threats are not clearly known at this time. Many enterprises struggle with committing resources to a problem that may never happen. … Threats to an enterprise come in various ways; they could be from terrorists, a natural disaster, insider threat, corporate espionage, or cyber attack (this is not an exhaustive list).

According to Fortier and J. Bret Michael, "There is a potential for a loss of humanity, property and efficacy during any accident, natural disaster or terrorist event." The loss of efficacy, resulting from an emergency or related event, is usually the largest cost factor. F. Bird and R. Loftus explained that the risk of "loss of life and property were 'covered' by insurance," but the loss of efficacy and productivity could not be recouped as a result of a disaster. Therefore, manufacturing risk needs to be understood from both internal and external factors, and those risks need to be documented and quantified.

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See Also: Business Continuity Planning; Cyber Crime; Hazard Vulnerability Analysis; Insurance; Risk Assessment; Supply Chain; Terrorism; Worker Error.

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Marine Shipping

Crisis management for maritime security is essential to international relations and trade among governments and business organizations. A number of initiatives have been developed to address security issues on ships and in national and international ports, including the International Ship and Port Security (ISPS) code, Container Security Initiative (CSI), and Customs and Trade Partnership Against Terrorism (C-TPAT). The main purpose of these initiatives is to minimize the threat of maritime terrorism and piracy by eliminating the means.

The crisis response to the terrorist attack against the United States on September 11, 2001, was the closure of domestic air space and the diversion of international flights. This initial focus of crisis management soon extended to maritime security because of the fear of terrorism in the maritime transport and trade sector. With the increasing mass movement of goods and services across economic boundaries, concern intensified in the years after September 11 and in the aftermath of the terrorist incidents in Bali, Madrid, Jakarta, and London.

Maritime Security and Crisis Management

Maritime security breaches occur from the interaction of a number of factors, namely:

- *Cargo:* using cargo to smuggle people and/or weapons (of a conventional, nuclear, chemical, or biological nature);
- *Vessel:* using the vessel as a weapon or means to launch an attack (including sinking a vessel to disrupt infrastructure); and
- *People:* using fraudulent seafarer identity to support terrorist activities.

Specific security risks typically emerge from one or more of these factors. In the United States, there is concern over the potential for terrorism involving commercial ships that are not registered in that country and are crewed by non-U.S. nationals. A related danger is the lack of transparency and clarity in ship registration and ownership. As a result, vessels with questionable or anonymous identities operate with impunity. A majority of countries tolerate mechanisms that could enable terrorists or criminal elements to use these vessels for illegal and/or terroristic purposes. This threat is real, as effective maritime security is often compromised not only by the complexity of modern port operations but also by the difficulty in implementing security coverage. For example, although over 90 percent of the world’s international cargo is transported in shipping containers, no more than 5 percent undergoes physical inspection after arrival at a destination. This oversight raises concern about the ability to covertly move contraband material, including humans, through vast and complex global supply chains. The sheer size and complexity of the modern maritime industry make it difficult to develop and implement policies and practices that ensure uniform and effective international maritime security.

The International Maritime Organization (IMO), International Maritime Bureau (IMB), and other marine-related organizations such as the World Customs Organization (WCO) jointly support regulatory coverage that bolsters safety and security procedures and practices within the world maritime trading system. Through the efforts of the IMO, a number of security measures have been formalized, including changes to the Safety of Life at Sea (SOLAS) convention that specifically call for compliance with updated security and safety requirements with the ISPS. In addition to these mandatory changes, the United States has actively introduced a series of voluntary trade programs that include the CSI and C-TPAT into North American seaports and indirectly into other major trading seaports of the world. While not binding on participating ports, carriers, and companies, the proposed measures and strategies attempt to provide maximum levels of security in each stage of the maritime supply and logistics chain including the storage, movement, and unpacking of cargo. These measures are intended to provide a competitive advantage to early voluntary adopters over time. While most of the major trading ports have voluntarily adopted the CSI initiatives, significant gaps in maritime security coverage still remain.

Crisis Management in the Asia-Pacific Region

Maritime crisis management involves consultation, coordination, and cooperation between and among members of trade blocs, governments, and government regulators. In the effort to prevent maritime terrorism and piracy, partnerships are continually encouraged and developed among the various stakeholders. For example, the Asia-Pacific Economic Cooperation (APEC), the Association of South East Asian Nations (ASEAN), and the Secure Trade in the APEC Region (STAR) work together to strengthen maritime security while boosting trade efficiency. In addition to supporting the implementation of the ISPS code, these organizations encourage, across a number of critical security areas, the application of common standards that require and regulate, for example, electronic customs reporting, which is a WCO program; comprehensive baggage screening procedures; and the collection and transmission of advanced passenger information to prevent the fraudulent use of travel documents by terrorists.

While combating threats to security, maritime industry leaders regularly communicate and cooperate to update trade and antiterrorist legislation and keep abreast of the latest technologies, data, and intelligence resources. This is accomplished in part by participation in the ASEAN Regional Forum (ARF) and the Council for Security Cooperation in the Asia Pacific (CSCAP), which address common international maritime security issues and threats.

A current working partnership is one between Hawai‘i and the Asia-Pacific nations. Since 2003, they have coordinated their efforts to establish and implement a global standard for ship and port security. The CSI and the C-TPAT play important roles in addressing vulnerabilities in the shipping industry in the Asia-Pacific region. The CSI authorizes exchanges of customs inspectors between the United States and participating nations, and allows the United States to place inspectors in 26 international ports including Singapore, Hong Kong, Malaysia, and Korea. The CSI enables custom officers to safely and efficiently screen for contraband, including weapons of mass destruction, by using large-scale gamma ray and imaging systems. These units can scan the interior of a full-size, 40-foot container in under one minute. Other technologies, such as electronic seals and container tracking devices, offer additional protection against container tampering and help secure ports and ships from possible attack. These precautions are critical to the Asia-Pacific region, which has some of the largest container ports in the world; one-third of the world's shipping and half of its oil pass through the straits of Southeast Asia, according to the U.S. Department of State. Maritime security is a high priority for the region, and the cooperation of the international community remains integral for dealing with multiple threats in the maritime environment.

Conclusion

More effective and efficient means are needed to implement existing legislation, regulations, and voluntary security initiatives like the CSI and the C-TPAT. An important issue for future research is the impact of implementing both the treaty-mandated ISPS code and the voluntary CSI and C-TPAT initiatives at operational ports.

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See Also: Air Travel; Department of Homeland Security (DHS); Marine Travel; Terrorism; Transportation Security; Transportation Systems, Vulnerability.

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Marine Travel

Marine travel poses a number of potential hazards, the most serious of which are extreme weather events such as hurricanes, and events of human aggression, such as piracy or terrorism. Attacks on civilian vessels by enemy powers during times of war, once commonplace, are no longer permitted under the international laws of armed conflict, so long as the vessel has not entered the attacker's territorial waters (and even then, the attack will not likely be deemed permissible). Territorial waters extend from the coastline to no more than 12 nautical miles out to sea, beyond which are international waters, and are an extension of a state's sovereign territory over which it has have exclusive control. Under normal circumstances, innocent passage of any vessel—military or civilian—is permitted through territorial waters, though it must abide by that nation's laws while doing so.

An early Cold War-era incident in 1946 took place at the Channel of Corfu, a passage from the Adriatic Sea to the Ionian Sea along the coasts of Greece and Albania. On three occasions, British Royal Navy ships were accused of trespassing in Albanian territorial waters. On the first occasion, they were fired upon, for which the government refused to apologize. On the second occasion, Royal Navy ships were ordered to test the Albanian response to their innocent passage and, in so doing, sustained damage from mines. On the third occasion, two weeks later, Royal Navy ships embarked on a mine-sweeping operation through the channel, with a French naval officer present as a neutral observer, in order to prove that mines had been deliberately placed in the channel. Again, rather than apologizing or responding to Britain's demand for reparations, Albania complained to the United Nations that Britain had trespassed. The British government filed a case with the International Court of Justice, which became that court's first case; when Albania refused to pay the reparations ordered by the court, Britain seized a portion of the gold that had been looted from Albania by the Axis powers and later recovered by the Allies. The dispute was not resolved until 1996, after the Communist regime of Albania had been dissolved for five years, at which time Albania paid reparations and Britain returned its gold.

In the United States, maritime security is one of the basic responsibilities of the Coast Guard, which is tasked with port, vessel, and maritime facility security against terrorism or sabotage. Port Security Units provide sustained force protection operations through deployable units that can work in conjunction with Coast Guard patrol boats and cutters, the Marine Corps's Fleet Anti-Terrorism Security Teams, and units from the Navy. The Coast Guard is also responsible for port safety, a function that includes the safety of

Members of a visit, board, search, and seizure (VBSS) team from the U.S. Navy and U.S. Coast Guard approach a suspected pirate mothership after responding to a merchant vessel distress signal. The team is part of the multinational Combined Task Force 151, which conducts counter-piracy operations to actively deter, disrupt, and suppress piracy in order to protect global maritime security and freedom of navigation. Piracy has resurged in some areas; at its peak in 2006 to 2007, violent attacks rose by 35 percent.

vessels, harbors, and waterfront facilities from accidents. The U.S. Merchant Marine consists of the privately owned and operated merchant ships of the United States and their crews and is responsible for peacetime transport of cargo and passengers; in times of war, merchant mariners are classed as military personnel, and their ships may be used to deliver military supplies and personnel.

Piracy and Political Unrest

Piracy, the crime of robbery or kidnapping at sea, is one of the oldest maritime hazards, and it became a special matter of concern in the 16th to 19th centuries, when maritime shipping lanes were trafficked heavily enough to provide incentive to these highwaymen of the sea. Toward the end of the 19th century, piracy fell to a low in most parts of the world and remained rare enough that in the 20th century, the word *piracy* became more common to refer figuratively to intellectual property theft. In the modern era, shipping lanes are better patrolled by law enforcement authorities, though piracy never disappeared entirely, and maritime shipping accounts for a large amount of international commerce, making for many tempting targets.

In recent years, piracy has resurged in some parts of the world, especially areas where local countries lack the means or motive to adequately prevent piracy and/or shipping is routed through narrow bodies of water like the Strait of Malacca. The combination of these factors increases the rewards and reduces the risks for prospective pirates. In some cases, the pirates are better armed than law enforcement would be anyway.

The surge in 21st-century piracy is primarily owed to hostage taking, which is one reason it has received so much attention. From 2006 to 2007, at the height of the surge, violent attacks rose by 35 percent, and injuries sustained by victims of piracy nearly quadrupled, though the rate of murder remained low. In both years, the majority of piracy attacks involved hostage taking or attempted hostage taking.

Political unrest is one of the conditions that can lead to unchecked piracy. In West Africa's Gulf of Guinea, near countries like Côte d'Ivoire and the Democratic Republic of Congo, which have been sites of ongoing armed conflicts and internal chaos, 21st-century pirates originally targeted oil companies in order to seize their valuable cargo; as pirates became better armed and better organized, they expanded to the kidnapping and ransom tactics seen elsewhere, and the level of violence seen in the region was by the end of the 2000s dangerously high. Similarly, since the second phase of the Somali civil war, piracy in Somalia has grown immensely, costing at least $6 billion a year in goods and ransoms, though it finally saw a decline beginning in 2011.

The role that political unrest plays in the growth of piracy is complex. Not only can unrest divert government resources away from counterpiracy and other law enforcement, toward dealing with the internal crisis, or fighting on multiple internal fronts—in Somalia's case, civil war and poverty have transformed it into a failed state—but it also can disrupt elements of the private sector in order to create criminals out of conditions of desperation. Somali pirates, like pirates in some places during the Golden Age of Piracy, actually have the strong support of the nonpirating public in Somalia's coastal towns. Traditionally supported by fishing, these towns see piracy as a defense against the opportunistic exploitation of their territorial waters by parties who have taken advantage of Somalia's chaos to engage in illegal fishing and dump toxic waste. The influx of money and goods to these coastal communities as a result of piracy has been the only economic good news many of the towns have had in years. Many Somali pirates are former fishermen who have converted their boats to this new means of earning an income. Others are young teenagers. Even humanitarian aid ships approaching Somalia's waters have been attacked and their food stolen; many of them now travel with an escort, increasing the cost of providing aid to Somalia. These are the factors that have made piracy so difficult to contend with; after all, in the Golden Age of Piracy, piracy was not so much defeated as it simply declined naturally as conditions shifted such that the risk-reward ratio of the endeavor was no longer as favorable.

The Mexican drug war that has been waged since 2006 has recently led to an increase (from negligible to extant) in piracy along the U.S.-Mexican border, particularly the human-made reservoir of Falcon Lake on the Rio Grande. The conflicts of the Mexican drug war led to a struggle for control of the lake between Los Zetas drug cartel and its rival cartels (mainly the Gulf Cartel) in 2010. Los Zetas began patrols of the lake, and although the goal of the patrols is principally to find and attack ships of rival cartels, Los Zetas have increased their fleet by seizing civilian fishing boats. In some cases, they also have robbed the crew; in others, they have compelled the crew to pilot the ship, increasing the scope of their patrol. The conflict has led to one civilian casualty as of 2012 and a dozen cartel casualties.

Piracy has been an unintended boon for the insurance industry; not only have premiums risen for those vulnerable to piracy, but also many more people and organizations now take out policies for kidnapping and piracy insurance. Kidnapping insurance exists in order to provide the ransom fee in the event of a kidnapping incident, while piracy insurance offers special protections against financial losses incurred by piracy that might not be covered by existing policies.

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See Also: Hijackings; Hurricanes, Typhoons, and Cyclones; Insurance; Marine Shipping; Preparedness; Sabotage; Terrorism; Tornadoes and Severe Thunderstorms; Transportation Security; Tsunamis.

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Mass Care

A mass care event (MCE) occurs when the ordinary functioning of a community's health care resources is overwhelmed by a large number of victims requiring care at the same time, for instance, as the result of an influenza epidemic or a terrorist attack. The severity of an MCE may be increased if the event itself reduces the community's capacity to respond (for instance, if health care workers become ill, or if vital infrastructure is destroyed) or if multiple communities are affected at the same time, so that additional resources cannot be quickly accessed. If resources (including both supplies and trained personnel) are scarce during an MCE, decisions about care with an eye to saving as many lives as possible, while also allowing the health care system to continue to function, may differ from what might be done in an ordinary health care situation, when the usual levels of resources are available to treat each patient.

There are two major types of MCEs: sudden impact and developing impact. In a sudden impact MCE, such as an earthquake, explosion, or plane crash, there are many casualties all at once, but the number quickly tapers off. The central infrastructure (e.g., power supplies) may be damaged or destroyed, so the best option may be to move survivors elsewhere for care; in addition, there may be a secondary wave of casualties resulting from conditions such as exposure to unclean water. In a developing impact MCE, such as an influenza pandemic, the number of cases starts small but increases gradually until the situation becomes catastrophic. A developing impact MCE may require response over a long period of time, as case numbers may decline for a time, only to increase again. Sudden event MCEs are unpredictable and require rapid response, whereas developing impact MCEs are more predictable and build gradually, allowing more time for response.

Alternative Care Sites

Often, an MCE requires the creation of alternative care sites, because the demands for care are greater than can be met through existing hospitals. Examples of structures that could serve as alternative care sites include aircraft hangars, schools, churches, nursing homes, outpatient surgical clinics and centers, fairgrounds, government buildings, sports facilities, trailers, and tents. The expected needs of the emergency should be taken into account: for instance, oxygen and respiratory therapy is difficult to provide in an alternative care setting unless the facility is already set up to provide it (e.g., a nursing home). Advance planning is needed to stock the alternative care sites because the usual supply chain may not be functional during an emergency situation. Although staffing needs depend somewhat on the specific type of MCE, general plans can be drawn up in advance, and these should include nonmedical workers (e.g., security, food service) as well as physicians and nurses.

Housing large numbers of people in close quarters creates the ideal opportunity for the spread of disease, independent of a specific pandemic disease. Alternative care sites do not always lend themselves to controlling the spread of disease, and some of the people staffing them may lack medical training and be unfamiliar with ordinary infection control practices routinely practiced in hospitals. For these reasons, it is important to educate both workers and the people being cared for in basic practices to help prevent disease spread. For instance, hand hygiene is key to preventing the spread of many diseases; if soap and water are difficult to obtain, sanitizing gel should be available and everyone should be instructed to use it regularly. Facilities should be provided for laundry and for can bathing or showering at least twice a week. Living areas should be cleaned regularly, and high-risk surfaces (e.g., kitchen counters and areas used for changing diapers) should be sanitized with a disinfectant such as bleach. Procedures should be established for waste disposal, and medical waste must be separated from household waste.

Alternative care centers not ordinarily meant for residential use, such as football stadiums, should only be used for the short term because they lack sufficient toilet facilities, or bathing facilities make it difficult to maintain healthy conditions for any length of time. Normally, food service and laundry should be provided externally so that proper hygiene can be maintained, rather than them being provided within the facility or people providing for themselves. Particular care should be exercised to regularly sanitize bathroom facilities and to emphasize the importance of hand hygiene. In open sleeping areas, cots should be separated by at least three feet to prevent disease transmission.

Because infections can spread rapidly within an alternative care center, people should be screened upon entrance for fever, cough, skin rash, skin sores, open wounds, vomiting, and diarrhea; those with any of these conditions should be separated and evaluated by medical staff and possibly housed in a separate part of the facility. Standard precautions should be used by personnel who come in contact with infected individuals, including the use of gloves, gowns, and hand hygiene. Alternative care centers should have a plan in place for transferring people who need medical care to an appropriate facility, and there should be a dedicated area for evaluating and housing such individuals in order to prevent spreading infectious disease into the care center.

Triage

In response to a disaster or any other demand for immediate and widespread emergency medical care, a top priority must be efficiency of response. An immediate response system may include the practice of triage, so that care is given immediately to those who are critically injured but are expected to survive if given care; those with less serious injuries can be treated later, as can those without hope of survival. The purpose of triage is to maximize the effective use of medical resources. Triage is practiced at the scene of the incident, at the hospital entrance, and within the hospital. At the scene of the incident, the medical team assesses the extent of the problem, establishes a staging area, and defines treatment priorities; this is a difficult process but is frequently necessary because the need for medical care may exhaust the immediate ability to provide it. At the hospital, admission to treatment is also based on severity of injury. Within the hospital, triage may also be necessary to determine who gets a bed and who receives immediate services, such as surgery and X-rays.

Although the practice of triage may sound heartless to people who have never had to deal with an emergency situation in which the need for health care resources overwhelms the system's ability to provide, in fact, it is a practice that serves the humanitarian goal of doing as much good as possible with the resources available. Triage is aimed at preventing waste by using resources where they will do the most good; if resources are spent caring for people who are too injured or ill to survive, that takes the resources away from people who could survive if treated, thus reducing the total number of deaths. Because triage is a departure from the usual practice of the medical system in most industrialized countries, clear protocols should be developed defining different levels of care and how patients will be assigned to them. Planning for mass care situations should also include an inventory of available resources and projections of the demands on the care system expected from different types of MCEs; the latter should include expected demands for a multiweek period, such as the expected cases each week during a pandemic. The resource inventory prepared for MCEs should include human resources, both skilled and unskilled, and both health care workers and those needed for functions such as education and prevention; logistics, including both medical (e.g., pharmaceuticals, rehydration fluids, surgical masks) and nonmedical supplies (e.g., electricity, gasoline, communications equipment, clerical support); financial resources; and community resources, including alternate care sites.

Levels of care provided to patients during an MCE can be divided into four categories, and assigning patients to appropriate levels of care is an important factor in using resources wisely. Level 1 is unassisted home care; these patients can remain at home and do not need outside assistance because their care needs can be met through self-care or the assistance of a relative or other available person. Normally, resources are not allocated to Level 1 patients because they can survive without assistance. Level 2 is assisted home care; this includes people who can recover at home but need some medical assistance such as medications or oral rehydration fluids, or who need help with activities of daily living (e.g., bathing, cooking). For these patients, the goal is to keep them as healthy as possible; their needs can often be met by community volunteers or people with minimal levels of training. Level 3 is skilled clinical care; these patients require help from a clinically trained provider but may be treated at home or in an alternative care site. Examples of services at this level include provision of intravenous hydration or intravenous antibiotics. Sometimes patients at this level are treated at alternative care sites (e.g., schools) in order to maximize the number of patients who can be treated by a given care provider—bringing a number of patients into a single facility reduces the amount of time the provider must spend traveling. Level 4 is the highest available level of care, such as a hospital, if possible; these cases are the most severe and require skilled medical care within the most advanced facility available. If more patients require Level 4 care than there are facilities to treat them, decisions about whom to treat should be based on which patients are likely to survive if given care; those who are too severely injured or ill to be likely to benefit from care can be given palliative treatment at home or in an alternative facility.

Special Needs of Population Subgroups

Provision of mass care is often discussed as if all those affected by an emergency or disaster have the same needs. Although all humans have some needs in common, there are also particular needs relevant to particular population subgroups, and these should not be overlooked in planning and providing mass care. R. Richter and T. Flowers point out that women suffer from particular risks during a disaster and that gender-sensitive services should be provided but frequently are not; these services include triage screening for pregnancy, private areas for breast-feeding, sufficient nutrition for pregnant women, and counseling and care providers who are knowledgeable about the different ways that disorders such as PTSD may present in men and women. The Pan American Health Organization (PAHO) notes that providers of mass care should be alert to risks to which women are particularly vulnerable, such as rape, involuntary prostitution, and domestic violence, and that the disorder and disruption of normal societal functioning following an emergency may heighten the risks. The PAHO recommends that health care workers be trained to prevent these abuses and to treat victims, and that particular attention be paid to ensuring the security of high-risk subgroups such as teenage girls.

On a similar note, E. Cloyd and C. B. Dyer point out that elderly people often have particular needs following disasters or catastrophic events. Because chronic disease and cognitive disorders are more common among the elderly than among younger people, they may require extra services and may be less able to make judgments about matters such as when it is necessary to evacuate an area; lack of physical mobility may also complicate their ability to survive. The elderly are also particularly vulnerable to fraud and abuse during disasters. Cloyd and Dyer recommend that government establish an emergency tracking system for elders and other vulnerable adults, that separate areas within shelters be provided for them, and that gerontological professionals should be involved in planning for disasters and training the personnel who will respond during a disaster. Dyer and colleagues have created a rapid needs assessment tool, the SWiFT (seniors without families team) for elderly adults, which was successfully used to evaluate the needs of adults aged 65 and older who were evacuated to the Houston Astrodome Complex after Hurricane Katrina in 2005.

Infants and children also have special needs in emergency situations. The PAHO suggests that in a shelter or other emergency situation, a census of minors be conducted, including classification by age category: newborn (birth to 30 days), 1 month to 1 year of age, 1 to 5 years of age, and 5 years and older. Newborns with low birth weight, difficulties in regulating their body temperature, or problems with respiration are at particularly high risk and should be seen daily. Minors should be immunized, and nutrition and fluid intake for children should be monitored; children with diarrhea and respiratory infections should be monitored until they are in recovery. Because children are at high risk for violence and abuse, including sexual abuse, when normal societal conditions are disrupted, extra precautions should be established to protect them.

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See Also: Disaster Assessment; Disaster Drills; Emergency Medical Care; Health and Medical Response Scenarios; Infectious Disease; Shelter-in-Place.

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Mass Fatality Management

Mass fatality management refers to the identification, death certification, and preparation for last rites of a large number of bodies that come simultaneously from a single incident or event, such as an earthquake or a transportation crash. This article concentrates on cases in which there are approximately 50 to 250 bodies. Small numbers of fatalities can be coped with using normal facilities, and events that cause thousands of deaths require measures that are so exceptional they cannot usually be managed with detailed prior plans. This field is one of the least understood and most frequently neglected in disaster management. The assumption that few resources and little attention need to be dedicated to it because the dead do not care is quite untenable, as in reality it is a service for the living, namely, the grieving relatives and friends of the deceased.

Mass fatality management requires special planning and facilities because it is unlikely that hospitals and regular mortuaries will have enough capacity to deal simultaneously with all the bodies recovered from the incident or disaster. As there is a need for comparative analysis, it is essential to keep the victims together and not disperse them in small numbers to a variety of distant mortuaries.

Coping With Mass Fatalities

The recovery of bodies from an incident or disaster is usually not an instantaneous process. In an earthquake characterized by widespread and complex structural collapse, it may take up to 15 days, during which urban search and rescue (USAR) teams are deployed to search beneath rubble. In transportation crashes, it follows the stabilization of the scene (i.e., when it is safe for rescuers wearing personal protective gear to go in) and the recovery and treatment of the injured. The declaration of the site as "scene of the crime" may complicate matters. In this case, as soon as basic rescue is completed, which must happen with the minimum disturbance of the site, forensic investigation begins and evidence is collected for a judicial inquiry. This may focus on, for example, identifying the perpetrators of a terrorist attack, establishing that negligence occurred in an accident, identifying contaminants present at the site,

Case Studies in Mass Fatality Management

This section contains a brief review of selected bad and good examples of mass fatality management.

Italian Building Collapse

On the night of November 11, 1999, a multistory residential building comprising 26 apartments collapsed suddenly and spontaneously in the southern Italian city of Foggia. Rescue efforts were somewhat chaotic, but by the middle of the following day, 62 bodies had been recovered from under the rubble. Autopsies revealed that about half the victims died more or less instantaneously from crush injuries, one-third died of asphyxia, and the remainder suffocated after some hours of entrapment. One body was consumed by fire and could not rapidly be identified.

The bodies were taken to the only local hospital, which had no plan to cope with mass fatalities. It set aside a large area for identification and other procedures, but this was inadequately screened. It also lacked a plan to move into a disaster mode of operation, so there was confusion between ordinary health maintenance activities and the extraordinary work needed to cope with the influx of bodies (only nine people survived in the collapse, so there was no overloading of the facilities for treating them). Relatives and friends of the victims were kept waiting in corridors or outside the hospital in the cold, in some cases for up to 36 hours. Information was not given to them in any systematic way.

Terrorism Mass Fatalities Planning

In response to the threat of terrorism, London Resilience, the emergency planning unit of the British capital, developed a detailed mass fatalities plan. This was “owned” by the London Emergency Services Liaison Panel (LESLP), a long-standing consultative body. On July 7, 2005, four bombs went off in the city and 56 people, including four suicide terrorists, were killed. London Resilience immediately activated its prefabricated mortuary and set it up on a sports field close to the city center. The facility was entirely self-contained and included an electricity generator, a water supply, and a wastewater collection tank. It was designed and staffed to operate around the clock. Furniture was borrowed from the mayor’s office to create a dignified waiting and counseling area for the victims’ relatives and friends. A family liaison center was eventually set up to coordinate social work with the relatives of people who had been killed in the attacks. The mortuary work had to interface with an exceedingly complex forensic investigation. One aspect of this was that the remains of the terrorists had been blown into more than a thousand fragments. Each of these had to be identified (by DNA testing), as families did not want their loved ones to be buried or cremated along with pieces of the terrorists. Another unexpected consequence was that the owner of the sports facility initiated legal proceedings to obtain compensation for income lost during the period of closure. The London Mass Fatalities Plan was later more widely adopted in Britain and abroad.

Swedish Deaths in the Indian Ocean Tsunami

Mass fatalities management has an international dimension. Some 543 Swedes died in the Indian Ocean tsunami of December 26, 2004, mostly in Thailand. The mass repatriation of bodies to Sweden revealed that the country had no facilities for managing such a contingency, the largest loss of Swedish life in a single event since 1709. The resulting barrage of criticism induced the Swedish government to found a civil protection agency, which was later reorganized into the Swedish Civil Contingencies Secretariat (MSB), an organization that rapidly achieved eminence in the field of disaster risk reduction.

or simply determining the cause of the incident. Establishing the cause of death, recording the physical state of bodies, and identifying victims may contribute to the process of reconstructing the elements and dynamics of the event in order to assist the judicial inquiry.

The best response to a mass fatality incident is to have a functional plan that is known to all key participants, and also to have a temporary mortuary with sufficient capacity to hold and deal with all bodies, if the numbers are not excessively large, or a significant proportion of them if they are very numerous.

The plan can either designate existing buildings as sites for a mortuary or use prefabricated buildings, providing these can be assembled quickly. In the former case, buildings should be designated at a variety of sites. The buildings in question must be capable of being equipped rapidly with the facilities listed below. They must be in accessible locations but capable of operating discreetly, away from the public eye. In the case of a prefabricated mortuary, various sites such as sports fields can be designated as possible locations for assembling it. All participants should be familiar with the mass-fatalities plan and understand what their roles and responsibilities will be if an incident occurs.

The procedures for body recovery should ensure that the users of the main emergency plan know where to send dead bodies. Initially, a holding area may be needed while the temporary mortuary is set up. Body identification and death certification must take place, and possibly autopsies as well. The forensic examination should try to collect the personal effects of the deceased; like the bodies themselves, these need to be labeled and photographed. For both the identification of bodies and any judicial inquiry that takes place, evidence needs to be preserved strictly according to proper standards, and it must be kept free from contamination.

U.S. Navy, Air Force, and Coast Guard personnel, along with civilian firefighters from Guam, carefully extract one of only 35 survivors out of 254 people on board the tangled wreckage of Korean Airlines Flight 801, August 6, 1997. In heavy rain, the Boeing 747-300 missed the runway by three miles and crashed into a hillside. A temporary morgue was established at the U.S. Navy Supply Center and a Federal Bureau of Investigation fingerprint team arrived the next day. A team of cadaver dogs did a final search of the crash site two weeks later.

Facilities

A well-equipped temporary mortuary has a “dry” and a “wet” area. The former should include adequate space for turning, loading, and parking ambulances and hearses in front of an entrance that is screened from public view. Facilities should include heating, lighting, good ventilation, hot and cold running water, showers and toilet facilities, adequate drainage of liquids (possibly into a holding tank for subsequent disposal), telephones, and closed-circuit television (CCTV) for the recognition of bodies by relatives. The coroner or medical examiner requires an office, and there need to be X-ray facilities (including development of X-ray film if digital images are not used). Finally, a place is needed in which to stockpile coffins. The “wet” area needs autopsy tables, an area for washing bodies and another for embalming them, a dental examination bay, and a refrigeration bay for body storage. In some cases, cold storage units for wholesale food distribution may be commandeered for use as temporary mortuaries in order to benefit from their low-temperature storage areas. The suggested overall size of a temporary mortuary capable of dealing with, say, 200 bodies is about 200 square meters (30 × 2 meters for holding the bodies, plus space for the working areas).

When the structure is activated, it needs to be fully integrated with logistical and administrative support structures. Attention also needs to be paid to the maintenance of safety at work in view of the risks of contamination and infection. Personnel should include a coroner or lead pathologist (medical examiner), who heads the commission for body identification. There needs to be an orthodontic specialist for work on dental records and a biometric expert for work on fingerprints and other such measurements. Where the features of victims are quite unrecognizable and dental records cannot be used, a forensic anthropologist may be asked to participate. In addition, police and representatives of social services may look after the relatives of victims, and religious leaders and psychologists may provide counseling. Body identification by the relatives and friends of victims requires a screened area with restricted access, CCTV links to the mortuary, and restful, quiet, and discreet spaces in which people may be received and given counseling or other support. In the design of the mortuary and associated planning, it is important to make arrangements that preserve human dignity and, wherever possible, satisfy religious and cultural needs. The plans should aim to minimize the strain upon relatives and exclude mass media representatives or restrict their access.

Procedures

In many countries, the law demands that inquests be held, and perhaps autopsies carried out, when death is violent or unnatural, when its cause is unexplained, or when there are other specific circumstances of importance to public health and safety. The inquest must determine who the deceased was and how, when, where, and of what he or she died. The proper registration of death depends on establishment of these facts.

The temporary mortuary can be used for the preservation and cosmetic treatment of the body (if these are deemed necessary) and to prepare the body for release to funeral directors. In most countries, a body is owned neither by the victim’s relatives nor by the civil authorities. However, there are customary “rights of possession,” and detention of the body may only be practiced in relation to the laws on inquests, autopsies, and death certification and to ascertain the victim’s identity.

The identification of dead victims may require the collection of information from relatives (for example, fingerprints from the person’s home where he or she is known to have touched certain objects) and the examination of medical, dental, or criminal records. Where relatives can positively identify a body and fingerprints match unequivocally those in police records, it may be sufficient to use one criterion in the identification process. However, there are many opportunities for misidentification, and hence it is common for at least two criteria to be used. Besides fingerprints (when these are not in police records) and comparison of teeth with dental records, body marks such as scars, moles, tattoos, and piercings can be used. Identified clothes and personal effects may corroborate other evidence, and finally there may be criteria for exclusion, such as the elimination of names from a passenger list. DNA (deoxyribonucleic acid) is not automatically employed in victim identification. Its use is only valid where there is no possibility of cross-contamination in samples tested.

Software has been developed in Scandinavia for managing identification in mass casualty situations, a procedure in which errors and misidentifications could have very serious consequences. In Europe as a whole, Interpol is coordinating a project on international disaster victim identification. It involves the creation of a database on victims that has advanced software features that include three-dimensional morphing, craniofacial reconstruction and superimposition techniques, and search facilities for the database. The aim is to speed up the process of identifying victims after disaster has struck.

Some coronary procedures are at variance with religious practices for dealing with the dead, but while ensuring compliance with the law, it is good practice to respect the wishes of a victim's family concerning the preparation of the body for release, funeral rites, and disposal by burial or cremation.

At least 13 different major religions have common practices for dealing with the dead. Space precludes a review of all of them, but by way of example, a victim who came from a strict Muslim background may need to be treated, as far as reasonably possible, as follows:

- The body should be identified quickly to verify that the person was a Muslim
- In mass casualty situations, Muslim bodies should be kept together
- The body should be laid out on a clean surface and covered with a simple white sheet
- The head should be inclined toward the right shoulder
- The face should be turned toward Mecca
- Muslim bodies are always buried and never cremated
- Aside from the legal and practical dictates of work in pathology, only close relatives should handle the body
- Burial should take place at the earliest possible opportunity and with appropriate rites

Requirements for Islam and other religions may be more or less elaborate depending on the strength of observance by the victim and his or her family.

Conclusion

Mass fatality management is not one of the most popular aspects of emergency planning; however, because of the need to minimize impacts on the bereaved, it is a very important part of disaster management and one that would benefit greatly from meticulous planning. This should include the selection of sites or facilities, accumulation of portable equipment, training of personnel, and integration of the mass fatality plan with emergency plans for search and rescue, medical care, social care in the aftermath, and forensic and legal investigations of the scene of the incident. As demonstrated here, managing the dead is an entirely separate issue from managing mass casualties.

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See Also: Civil Protection; Contingency Planning; Emergency Management Agencies, City and County; Emergency Medicine; Epidemics; Health and Medical Response Scenarios; Incident Management; Incident Response; Mass Care; Strategic Plans.

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Mass Media

In industrialized societies, the mass media discourse is among the most important cultural resources for obtaining information and understanding issues. Following a crisis event, the mass media serve as an important link between people and the impacted area by providing a basis for common understanding of the event and promoting public response. In this way, the mass media create a mental picture and understanding of the crisis to the public, who rely on reported information as a source of reality. Persistent exposure to television, for example, leads to an eventual adoption of its view of social reality above any other view of the outside world, and heavy doses of exposure to sensational media reporting can cultivate exaggerated perceptions of false occurrences in the real world.

Thus, audiences may define or interpret a crisis and develop specific responses in line with messages obtained from the media. This dependency on the media for information shapes public response toward relief, recovery, and mitigation efforts. Public understandings of crisis events are shaped by media reporting because such events are typically not observed directly. As a result, the public often relies on media reports to understand what happened and to learn appropriate responses. Invariably, media coverage is selective as constraints such as available time, space, and budgets force the media to make decisions about what to convey, and these choices shape their construction of a social narrative. Thus, the news functions as both a producer and a product of the culture in which it is consumed.

Media Reporting of Disaster Myths

The mass media cannot cover all aspects of a crisis, and thus, they are forced to choose what to cover and give preference to dramatic and novel issues. Moreover, the mass media may be under pressure to provide information as quickly as possible and therefore fail to consult credible sources, which increases the likelihood that information will be altered. Thus, the way the media select and organize news stories allows for the reinforcement of cultural myths of disaster—such as widespread panic, irrational or hysterical flight in which crisis victims show complete disregard for others, price gouging, the increase in price of necessary goods in the height of a crisis, looting, and the stealing of luxury items during a crisis—despite the lack of scientific evidence that these behaviors significantly increase during times of crisis. These sensational stories help gain public attention and audience share in a competitive media market. For example, following Hurricane Katrina in 2005, antisocial behavior, such as price gouging, was reported by the mass media as typical and widespread, even though pro-social behavior was by far the norm. Moreover, following Hurricane Gilbert in 1988, looting was reported by the mass media, despite a decline in crime rates in Houston, Texas, to below normal rates, and there were no confirmed cases of looting.

Media Reporting Strategies

The following are eight key strategies that the mass media use to cover crises and disasters.

Piggybacking: The mass media often use the strategy of "piggybacking," or constructing a new crisis as similar to a preexisting crisis. For example, the mass media argued that the inadequate government response efforts following Hurricane Katrina were similar to those of the 2010 British Petroleum (BP) oil spill in order to help their audience relate to the scope of the catastrophe.

Personalizing the problem: Providing personal details about the crisis, such as information about the numbers of fatalities, helps arouse an emotional reaction in an audience.

Horrifying consequences: This involves convincing the public that the crisis is morally troublesome by highlighting the extreme consequences, such as the amount of damage to infrastructure in the impact area.

Constructing villains and victims: The media identify who is responsible (villains) for problems during the crisis and the unsuspecting innocent people who are at risk (victims).

Visuals: The use of visual aids such as pictures or videos is leveraged to present information about the crisis; typically, crisis events have dramatic visual components that help journalists generate audience interest and attention. For example, the

Case Study: Media, Humanitarian Assistance, and the 2004 Indian Ocean Tsunami

Newspaper and television reports on crises, especially in Western countries, make up a significant portion of media coverage. In 1985, natural disasters, technological hazards, and civil disorders were thought to make up roughly 25 percent of all news stories in the United States. Seven years later, news reports covering crises transmitted annually by the Reuters news service grew by 75 percent, and crisis stories focusing on strong human interest more than doubled over the same period. In the last decade, more than 60 percent of Americans relied on newspaper articles and 70 percent used electronic media for information about crises. This reliance upon media coverage results in a dependency in which media shape the opinions of individuals who rely on reported information for understanding a crisis, actions that should be taken in response, and future responses such as policy decisions. Extensive news coverage of a crisis, such as the 2004 Indian Ocean tsunami, can be influential in mobilizing resources for impacted areas, as print media coverage is highly associated with donations.

The Earthquake Strikes

On December 26, 2004, a 9.3 magnitude earthquake ripped open the ocean floor 160 kilometers (100 miles) off the western coast of Sumatra, Indonesia. The earthquake was the second-largest ever recorded on a seismograph, with the largest occurring in Valdivia, Chile, in 1960. The magnitude of the earthquake was 9.0, the fourth-largest-magnitude earthquake in the world since 1900, and the largest since the Alaska earthquake in 1964. This earthquake, referred to by the scientific community as the Great Sumatra–Andaman earthquake, spawned one of the most destructive and powerful tsunamis in recorded history, most commonly known as the Indian Ocean tsunami, the Boxing Day tsunami (Canada), or the Asian tsunami.

The catastrophic conditions generated intensive mass media coverage in the days that followed the initial impact, particularly in Western countries, which led to individuals, organizations, and governments sending unprecedented amounts of material and financial assistance totaling $14 billion. More than half the pledges of aid from international governments came from the United States, Japan, Germany, Australia, and the European Union. The U.S. Congress, for example, appropriated approximately $908 million in assistance for relief, recovery, and reconstruction efforts, and the Red Cross and its partners had a budget of over $581 million that was used to assist more than 3.6 million people through disease control activities. Media reported relief efforts as “the most generous and immediately funded international humanitarian response ever.”

However, although the response initiative was reported by the mass media as unprecedented, examination of organizations, governments, and countries involved showed that it was problematic for at least five reasons. First, funding was not “need” based; the Tsunami Evaluation Coalition (TEC) assessment report found that most funding decisions were made without any type of needs assessment. Second, assessments were slow and shared among different organizations. Third, media and politically driven donor competition caused world leaders to announce extremely high and unrealistic aid pledges. Fourth, aid was not distributed proportionately throughout the impacted area. Fifth, funding was not based on quality and capacity. For example, some donors only supported nongovernmental organizations (NGOs) of their national origin, and attention was not paid to types of appropriate and needed supplies. These issues were widespread, especially when examining media reports of individuals directly affected by the tsunami, yet nearly nonexistent when examining reports of aid from a Western perspective.

The Problem of Ethnocentrism

Many of these problems occurred because of an accepted ethnocentricity of survival needs reported by the media, which has been problematic during international aid response for decades. Ethnocentrism is one of the seven most identified clusters of “enduring values” in American news (the other six are altruistic democracy, responsible capitalism, small-town pastoralism, individualism, social order, and national leadership), and it is most obvious in domestic coverage of foreign news. An assumed uniformity of needs causes the donation of culturally insensitive and unacceptable goods, such as international relief ranging from unusable supplies such as prom dresses and high-heeled shoes to donations not conducive to a warm climate, such as parkas. After the tsunami, inappropriate and unusable items were so common in Indonesia that the secretary-general of the Indonesian Red Cross was forced to send a letter to other Red Cross agencies complaining about the types of donations and the failure to provide an adequate response in the area. For example, pork was sent to a predominantly Muslim area in Aceh. Thus, mass media coverage—and public dependence on the media for information—played a pivotal role in constructing relief efforts in donor and recipient countries following the 2004 Indian Ocean tsunami.

mass media consistently manufacture images of individuals looting and panicking because they offer dramatic visuals that help generate high audience share and viewership.

Statistics: The use of statistics can highlight the size and scope of the crisis; often, a statistical increase—such as estimates of the number of injuries or casualties—provides media with the opportunity to report on the increasing severity of the problem. For example, the mass media continuously reported on the spread of wildfires in Texas in 2009 by updating the public with estimates of the numbers of homes and wildlife threatened and the extent of environmental damage, and it was not until the fire was contained that the media moved on to other news stories.

Geographic location: Location is especially pertinent when it involves the relationship between proximity and distance of the crisis to a large metropolitan area and media center. Since news organizations and workers tend to be located in large metropolitan areas, there is a greater likelihood that crises in these areas will receive heightened media coverage. Media organizations do not need to expend financial resources to send journalists to a remote location if they can cover crises in close proximity to their news operation. In addition, crises that take place in large metropolitan areas tend to generate the attention of a large populace that lives within these areas.

Blame: The ability to identify a responsible individual or organization helps the media narrow their focus on the presumed cause of the crisis and create a narrative of what should be done to resolve the problem.

Since crises often involve a great deal of complex material, the mass media frequently select certain aspects of the problem to report, such as the responsible party. Taken together, journalists and other media professionals use these reporting strategies to create a strong emotional response in their audience, such as a sense of fear, anger, or frustration that will help stimulate public interest in taking measures to rectify the crisis.

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See Also: Blame, Politics of; Information Asymmetry; Information Vacuums; Looting; News Media; Public Image; Tsunamis.

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Maximum Acceptable Outage

Maximum acceptable outage (MAO) is the term given to the maximum period of time that a system or key product can be unavailable or undeliverable following a disruption before its loss will have an irreparable impact upon a business, service, or organization's objectives or survival. Maximum acceptable outage is also frequently referred to as maximum allowable outage or maximum tolerable period of disruption (MTPOD), particularly within the United Kingdom. Identifying the maximum acceptable outage periods allows businesses, organizations, and service providers to understand their key products and services, to prioritize management of activities during a crisis, and to prepare for a swift and effective recovery.

Background

The concept of MAOs came into being with the introduction of the British Standard Institute's BS 25999, published at the end of 2007. The standard requires the dependencies of crucial activities to be identified within organizations. Section 4 of the standard states that the goal of a business impact analysis (BIA) is to determine the impact of a disruption of any activity that supports the organization's key products and services. This is in part achieved through the identification of maximum acceptable outages. The MAO is therefore a key aspect of undertaking a BIA of a business, organization, or service provider, with the intention of determining the impact of a disruption of any activity that supports the organization's key products or services.

Identifying Maximum Acceptable Outage

The MAO assists an organization's management to understand the service itself, as it also adds clarity to the organization's recovery priorities. Understanding the MAO allows management to ensure that proper plans are in place in order to ensure that the customer's maximum tolerance is not exceeded.

Identifying and understanding maximum acceptable outages comprises several stages. The initial stage is to identify the key activities, products, and services of the organization or business. Business continuity managers and business impact analysts must necessarily perform this stage in consultation with the organization's management. All key activities must be considered, whether they are internal or external-facing. The identified key outputs are then prioritized according to their importance to the running of the organization or business. Key products and services are assessed in terms of a variety of demands, including customer expectations, reputational issues, regulatory requirements, strategic consequences, and financial and operational impairment.

Departments, functions, and processes of each key activity, product, and service are then mapped. In performing this mapping activity, the amount of time required to perform activities necessary in order to deliver the product or service to its key stakeholders must be fully understood. This is often referred to as "cycle time." Organizational data are gathered in order to confirm or refute initial ideas about the MAO and to have detailed comprehensive information about departments, functions, and processes, including cycle times.

The length of time each individual product or service could remain undelivered before the business would experience difficulties must be identified. The MAO will be based on several factors, which may include lost income, public disruption, reputational damage, or regulation compliance issues. At this stage, the recovery time objective (RTO) can be identified. This is the point in time, following a disruption, by which the organization must recover the activity and operations must resume; the MAO is the upper bound on this time.

The process then continues by identifying and implementing response and recovery strategies that can meet the recovery objectives. The MAO enables businesses to focus on the eventual goal of recovery of their key products and services. Throughout this process, time sensitivity must be considered. Each organization is likely to have time periods when processing is especially critical or volumes are exceptionally high. The length of outage will depend on the time of day, day of the week, and time of the year. For example, if a call center has quiet periods during a Sunday, an outage occurring on a Sunday may continue longer than it would on a Monday morning, which may be a much busier period.

Hypothetical Examples

A broad range of possible disruptions should be considered. Disruptions are most often caused by a loss of access to a critical input; these are reasonably quick to rectify. However, extreme incidents, such as a total loss of assets resulting from a flood or fire, should also be considered. It should be understood that maximum acceptable outages are unique not only to each organization, business, or service provider but also to each process within a given organization. Despite this, it is still possible to look at examples of maximum acceptable outages in certain hypothetical businesses in order to gain an idea of what the process and outcome of understanding what a specific organization's maximum acceptable outage may look like.

A small, individually owned bakery may only have a handful of key products and services, as well as a relatively small number of staff and regular customers. Key services may include delivery of custom orders, in-shop sales of baked goods, custom-order cake sales, staff payments, and tax payments. These services decrease in importance and therefore increase in their maximum acceptable outage, ranging from two hours for the first key service to one day for the next two key services, and three months for tax payments. This example recognizes the importance of maintaining the provision of key products and services (in-shop sales and custom orders) to customers, while also recognizing that there is more leeway in relation to other key activities (staff and tax payments).

Another, more complex example is that of a hotel. The key services of a large hotel are likely to be greater in number than in a small bakery, but these may be grouped into several smaller specific areas. For example, these might include accommodation capacity, leisure facilities, bar and restaurant custom, and staff payments. Staff payments, as in the previous example, may be delayed by a week (or a month if staff are salaried). Leisure facilities such as gymnasiums and swimming pools may also be able to accept longer disruptions, from a few days to as much as a number of weeks. This is because these are not crucial services for customers despite being advertised as part of the total service package. Accommodation and provision of food and drink, however, are crucial to the running of a hotel. Each day that customers cannot be accommodated creates a key loss of income and, depending on the scale of accommodation that is disrupted, this loss of income could be extremely large. This also applies to bar and restaurant custom, as it is accounted for by walk-in customers as well as by residential guests. Therefore, such key services as these could only allow disruption of one to three days at the most.

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See Also: BS 25999; Business Continuity Planning; Business Impact Analysis; Disruption of Organizations; Recovery Time Objective.

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Measles

Measles (sometimes called rubeola) is a highly infectious respiratory disease that, in its severe form, can result in people developing blindness, encephalitis (brain inflammation), or pneumonia. Nearly 20 million people are infected with the measles virus every year, with 164,000 measles-related deaths, mostly in Africa and Asia. In the last 150 years, measles has claimed approximately 200 million lives. Ninety-five percent of measles-related deaths occur in the poorest countries, with weak or nonexistent health care systems. Even though a vaccine has been available since 1963, measles remains one of the leading causes of childhood death and kills more children than any other vaccine-preventable disease.

A young boy receives a measles vaccination in Fada, a rural village in northern Nigeria. In 2001, with the cooperation of the United Nations (UN) and nongovernmental agencies, the country launched an integrated measles campaign to protect 31 million children. Around the world, measles still kills more than 450 people each day—more than164,000 per year. That number has decreased by about 78 percent from 2000, when annual deaths reached 745,000. The UN Foundation's goal is to eradicate the disease in the next decade.

Origins

Measles is an ancient disease dating back to at least 600 B.C.E. However, the first scientific report of measles is credited to the physician Muhammad ibn Zakariya ar-Razi (860–932). Razi differentiated measles (which he called *hasbah*, meaning eruption) from smallpox and chicken pox and outlined his findings in his work *The Book of Smallpox and Measles*. It was not until the 14th century that the word *measles* was used. John Enders is recognized as cultivating the virus that causes measles (imorbillivirus) in a tissue culture in 1954. Maurice Hillemann, an employee at Merck, was the first to develop a successful vaccine and one of the first to include multiple live virus strains in 1963.

Classification and Natural Reservoir

The Centers for Disease Control and Prevention (CDC) classifies measles as a biosafety level two, which is considered a moderate potential hazard. Measles (without complications) is listed as ICD-10-B05 under the International Statistical Classification of Diseases and Related Health Problems (called ICD, for short). The measles virus is a paramyxovirus belonging to the genus *Morbillivirus*, which includes a number of highly infectious viruses that infect canines (i.e., distemper virus), cetaceans, dolphins, porpoises, and pilot whales (i.e., morbillivirus). Measles are classified under the Baltimore classification as a Group V virus because the viruses possess negative-sense single-stranded RNA genomes. There are 21 different strains of the measles virus. The measles virus is unrelated to rubella virus (commonly called German measles). The nature reservoir of measles is humans, and it is an endemic disease.

Incubation, Symptoms, and Transmission

The incubation period for measles is around 10 days, with a range of seven to 18 days before the start of a fever, followed by a rash. Specifically, around 10 to 12 days after exposure, a high fever

(104 degrees F or 40 degrees C) develops, which is the first symptom. The prodromal fever can last between four and seven days and is accompanied by the three Cs: coryza (head cold), cough, and conjunctivitis. Koplik spots also develop inside the mouth and on the cheeks, and their presence is a means to diagnose measles. Followed the three Cs and the Koplik spots is erythematous maculopapular rash around 14 days after exposure (range 7–18 days), that is typically localized in the upper neck and face area. After three days, the rash spreads across the body to the hands and feet, lasts about five or six days, then dissipates. If the person with measles survives, he or she has lifetime immunity to measles.

Measles can cause complications that can result in death, especially in young children who are malnourished, are vitamin A deficient, or have a weakened immune system, such as having human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS). The groups most vulnerable to measles-related death are children under 5 years of age and adults over 20 years of age. Encephalitis, blindness, ear infections, pneumonia and other respiratory infections, and severe diarrhea leading to dehydration are the most serious complications of measles.

The virus lives in the cells that line the back of the throat, lungs, or skin. Measles is a highly communicable infectious disease transmitted by airborne droplets (coughing or sneezing), direct face-to-face contact (breathing), and close contact with the infected person's nasal or throat secretions. The measles virus can remain airborne and on surfaces for two hours. Human-to-human transmission occurs one day before the prodromal fever to four days after the rash appears.

Diagnosis

Other than the presence of the three Cs, the Koplik spots, and rash, there are laboratory tests used to confirm the measles virus. Measles can be diagnosed by obtaining and testing swabs from the mouth, nose, or throat, as well as from urine, blood, serum, and aspirate (nasopharyngeal, respiratory) samples. Specimens collected right after rash develops are optimal for isolating the measles virus. Measles virus diagnosis is confirmed with a measles-specific immunoglobulin M (IgM) antibodies test or using a respiratory sample to isolate the measles virus RNA. If a blood sample is not available, a diagnosis can be confirmed by a salivary measles-specific immunoglobulin A (IgA) antibodies test.

Prevention, Treatment, and Management

The measles vaccine has been available for almost 50 years, and immunization is effective prevention at a cost of about $1. The vaccine is often combined with rubella and/or mumps vaccines, thus inoculating the individual against all three illnesses. The majority (85 percent) of the world's children receive one dose of the measles vaccine by their first birthday. About 15 percent of children immunized fail to develop immunity, so a second dose is necessary to ensure immunity.

There are no established treatments that kill the measles virus. As a result, treatment focuses on lessening symptoms as well as providing supportive care that lessens the effect of the most serious complications. The first is ensuring adequate rest, nutrition, and fluid intake (intravenous or oral) to prevent dehydration resulting from diarrhea or emesis (vomiting). Care also includes providing medications to reduce fever and manage pain, and antibiotics to treat secondary bacterial infections, such as eye and ear infections and/or pneumonia. In less developed countries, children diagnosed with measles should be given two doses of vitamin A over 48 hours to increase survivability and avert damage to the eyes and blindness.

Measles is highly communicable among almost all nonimmune people; children especially fall victim to measles if exposed. Management of measles is dependent on vaccination of people who have never had measles or been vaccinated to prevent infection. The introduction of measles into overcrowded situations, such as evacuation centers or refugee camps after an emergency and/or disaster, greatly increases the risk of infection. An emergency and/or disaster event disrupts immunization programs, and thus a population that has not been vaccinated or is not already immune (having had measles previously) to the measles virus that can result in a significant outbreak. Distribution of vaccines should be prioritized for young children at greatest risk of infection.

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See Also: Doctors Without Borders; Epidemics; Poverty; Public Health Surveillance; Quarantine.

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Mental Illness

Mental illness is a broad term typically used to refer to one or more of a series of disorders that are defined and described in the *International Classification of Diseases*, 10th edition, and in the United States are published in the *Diagnostic and Statistical Manual of Mental Disorders*, *Fourth Edition*, *Text Revision* (*DSM-IV-TR*). The National Institute of Mental Health (NIMH) has conducted research indicating that, in any given year, about one-fourth of the population of the United States has a diagnosable mental disorder. The World Health Organization (WHO) reports that more than 450 million people worldwide suffer from mental disorders. The NIMH estimates that about 6 percent of individuals have a serious mental illness (SMI). Crisis situations may result in the development or exacerbation of mental illness, and individuals with mental illness, especially serious mental illness, may be more vulnerable upon exposure to a crisis. Mental health professionals are vital in the process of assessing, managing, and resolving crises at individual, community, national, and international levels.

A crisis occurs when an individual perceives that his or her circumstances are beyond his or her ability to cope or there is a sudden or unexpected disruption in functioning. What becomes a crisis for one individual may not be a crisis for another. Among individuals diagnosed with mental illness, crisis situations may range from mild to severe. Suicidal behavior is one type of crisis situation found among the mentally ill. Based on data reported by the American Association of Suicidality, about 90 percent of individuals who commit suicide do so during an episode of mental illness. Based on information in the *DSM-IV-TR*, 15 percent of persons with a major depressive disorder and 10–15 percent of persons experiencing a bipolar I disorder complete suicide. Many more attempt suicide. Untreated mood disorders, including a major depressive disorder and bipolar I disorder, may contribute to the use and abuse of alcohol and other drugs, which in turn intensifies the risk of suicide.

More broadly, anyone who experiences a serious traumatic stressor will be impacted in some way. Although individuals differ in their emotional response to various crisis situations, common reactions include feeling overwhelmed or stressed, disbelief, experiencing grief, and feelings of loss. There may be cultural differences in the response to trauma and individual and group differences in symptoms.

Although it may be normative for individuals to have a brief and transient reaction to extreme stress, ongoing or severe disruptions in functioning can occur among some individuals and are more likely among vulnerable populations (e.g., disadvantaged, oppressed, mentally ill). Individuals who directly experience extreme crisis events such as natural disasters, terrorism, and sexual assault are more likely to be impacted than those who are indirectly impacted (e.g., witnessing the events or watching the events unfold on television). About one-third of individuals who experience a significant trauma are at risk to develop post-traumatic stress disorder. Significant traumatic stressors include serving in active military combat and witnessing death and/or serious injury, witnessing genocide, being physically or sexually assaulted, being in a car accident, being seriously injured in the workplace, experiencing an act of terrorism, and witnessing a natural disaster.

Mental Illness in a Crisis Situation

When an individual with a mental illness is in a crisis situation, he/she is assessed by licensed mental health professionals, such as psychologists, counselors, psychiatrists, and social workers. Crisis assessments typically occur in a one-on-one setting with a client/patient and a mental health professional in a clinician's office or in a hospital emergency room. There are also national crisis hotlines where crisis workers assess and manage crisis situations.

Typical approaches to crisis assessment include a mental status examination (a brief assessment during which a mental health professional asks a series of questions and makes observations that serve as a snapshot of the individual's current level of mental functioning), specialized risk assessment, and in-depth interviews. Based on information gathered during these assessments, varying levels of crisis management and intervention may be applied. Individuals who are determined to be at imminent risk of harm to self and/or others may be hospitalized in a psychiatric facility. If less restrictive means of intervention such as outpatient psychological or psychiatric treatment could be beneficial, individuals may be referred for such treatment. Managing crises related to mental illness may involve psychotherapy, crisis counseling, medication, hospitalization, or a combination of these treatments.

Crisis Response to Extreme Stress

Crisis management may be needed in response to experiences of extreme stress at the local, regional, national, and international level to prevent the development of mental illness among those impacted. Many national and international agencies provide such aid in times of crisis. Examples include the World Health Organization, the Centers for Disease Control in the United States, and the American Red Cross. Common types of response to prevent and/or manage mental illness following crisis situations include psychological first aid, crisis intervention, psychological debriefing, and longer-term mental health treatment. Psychological first aid is often organized through local, national, and international organizations and involves providers responding to immediate needs such as food and shelter, making information available as it develops, demonstrating empathy toward those impacted, and promoting the use of individual coping resources. Models of crisis intervention typically include the following: defining the crisis or problem; exploring thoughts and feelings related to the problem; explaining the impact of the crisis on the individual, family, and community; discussing what the person has already tried to resolve the crisis; brainstorming possible solutions to resolve the crisis; talking through the outcome of each solution; selecting the "best" option; and implementing it. Crisis intervention typically occurs at the individual or small-group level. Psychological debriefing or critical incident stress debriefing is a type of crisis intervention that has been applied on national and international levels in an effort to reduce the likelihood of the development of mental illness. There is no consistent evidence to support that psychological debriefing is effective. In fact, there are data that suggest it could even be harmful to persons who experience crisis. The WHO recommends the use of psychological first aid versus psychological debriefing in the face of large-scale events of extreme stress. Mental health professionals should also be prepared to make referrals to community-based support systems and resources for assistance in managing periods of extreme stress.

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See Also: Bureau for Crisis Prevention and Recovery, UN (UNDP–BCPR); Catastrophe, Definition of; Centers for Disease Control and Prevention (CDC); Crisis, Definition of; Crisis Management, Emerging Trends in; Debriefing; Decision Making Under Stress; Disaster, Definition of; Emergency, Definition of; Emergency Medical Care; Emergency Responders; Emergency Support Functions; Health and Medical Response Scenarios; Human Trafficking; Journaling; News Media; Panic, Nature and Conditions of; Post-Traumatic Stress Disorder; Poverty; Pre-Crisis Training and Planning; Public Awareness and Education; Red Cross and Red Crescent; Resiliency; Risk Analysis; Risk Assessment; Risk Treatment; Trauma; Vulnerable Populations; World Health Organization (WHO), UN.

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Mental Models

The term *mental model* refers to how a person or group of persons thinks about and mentally represents the objects, events, and relationships in their world. The models facilitate people’s ability to adapt to their environment. The concept of a mental model is used extensively in cognitive and social psychology and sociology (e.g., schema, symbolic interactionism).

Mental models are interpretive mechanisms. People use them to organize experiences, impose meaning on current events and circumstances, make sense of the consequences of events and their reactions (e.g., emotional) to them, guide how to perform in specific circumstances, and specify the conditions under which these performances will occur. They also influence how people make predictions about future events, plan appropriate actions to deal with them, and guide how they solve problems. Once developed, mental models become implicit or taken for granted (i.e., people are not aware of them or their influence). However, this does not mean that they do not change.

Mental models change and evolve as people accumulate experience. New information, acquired actively (e.g., from experience) or passively (e.g., from the media or communications from friends, relatives, or coworkers), interacts with people’s existing mental models in two ways. New content and existing mental models can interact in ways that result in new content being dismissed or interpreted to make it fit with previous assumptions (assimilation). A propensity to assimilate information (i.e., make it fit) makes mental models resistant to change. However, the more discordant the new information or experience is, the more likely it is to challenge or contradict current beliefs. This can lead to qualitative changes to people’s models and thus how they interpret and interact with salient objects, events, and relationships in their environment. The roles mental models play in how people deal with crisis events is illustrated with reference to risk communication, traumatic stress, and emergency management.

Risk Communication

An important facet of crisis management is proactively preparing people with the knowledge, skills, and abilities required to respond to future crisis events. However, because crisis events (e.g., earthquakes, terrorist acts) are rare and make demands on people that fall outside the realm of normal experience, the mental models people bring to the process of interpreting, comprehending, and using information in such circumstances are ill suited both to anticipating the nature and implications of future crises and to interpreting and using the information about future crisis events. It therefore becomes important to understand the role mental models play in risk communication.

All groups involved in crisis management possess mental models that guide their understanding of crisis. However, the models of the scientists who conduct hazard analyses, the emergency managers who use hazard analyses to develop crisis management strategies, and the general public who receive risk information differ. This introduces considerable diversity in how information is interpreted and used—or not used. These differences contribute to explaining problems associated with getting people to act on risk information even when that information is accurate and, objectively, has important implications for people.

Scientists operate at the most objective level of analysis, when compared to emergency managers, the general public, and the media. However, even scientists working in the same discipline can use different theoretical paradigms to inform their work and interpret data. Scientists translate their findings about potential crisis events into probabilistic statements about the characteristics of future events (e.g., frequency, return period, duration, magnitude, intensity). These probabilistic statements generally contain some degree of subjective interpretation even though science is often very quantitative. Emergency management professionals interpret scientific data through professional, social, political, and economic lenses to estimate what could happen and to guide the construction of their mitigation, preparedness, response, and recovery plans. They also communicate the outcomes of their deliberations to citizens both directly (e.g., via public education) and indirectly (e.g., via the media—which add their own interpretation). Members of the public, in turn, interpret information from scientific and civic sources (both directly and indirectly via media analysis) to determine whether they will act and to determine what they should do and when. Interpretation thus occurs at several levels.

The implications of interpretation occurring at multiple levels is encapsulated in the concept of the social amplification (or attenuation) of risk (SAR). SAR describes the implications of the existence of multiple layers of socially constructed interpretation for how people anticipate and make choices about future crisis events. SAR has been used to explain why seemingly small risks or risk events result in extraordinary concern by people.

Developing effective risk communication involves understanding how the mental models of sources and recipients can create diverse interpretive outcomes even when starting from the same information. Risk communication about future crisis events should assess and, if necessary, correct the misconceptions and myths in the mental models that facilitate people's understanding. They can then provide information tailored to the critical needs of specific groups in ways that facilitate the ability of the sources of crisis information and the recipients of this information to play complementary roles in the risk communication process. Mental models also inform understanding of people's reactions to large-scale crises.

Traumatic Stress

Crisis events can threaten people's existing ways of knowing and interpreting the world. This is evident when people experience traumatic stress. Crises expose people to a reality whose atypical, threatening characteristics result in their existing mental models becoming unable to impose meaning on the event and its consequences. An example is how existing models were shattered by direct and indirect experience of the 9/11 terrorist attacks. People were suddenly required to adapt their models to accommodate the growing threat of terrorism. Despite a long-held belief that their home soil was relatively safe from foreign attack, Americans lost this perception of safety on 9/11. Components of previous mental models, such as a sense of trust, stability, and confidence in one's personal world, were rendered less applicable. The ensuing loss of a sense of safety and security was replaced with mind-sets that defined the world as a more dangerous place in which feelings of helplessness and anxiety emerged. More than 10 years later, these beliefs remain entrenched in the mental models of some people, particularly those who were children, adolescents, and young adults during the 9/11 attacks.

The resolution of traumatic experiences includes ruminating about events in ways that help people develop new mental models. This process is believed to underpin the intrusive imagery characteristic of traumatic stress reactions. This represents the process of incorporating discordant aspects of the traumatic experience into new mental models. The resolution of traumatic experiences can result in the development of positive models. The latter is encapsulated in phenomena such as post-traumatic or adversarial growth. Mental models are also implicated in emergency management.

Emergency Management

Emergency managers respond to crises using mental models derived from their socialization into their profession and organization, their training, the experiences they accumulate over time, and the operating practices that prescribe how they respond to routine emergencies. However, atypical crisis event characteristics (e.g., the scale and diversity of consequences to be managed) and management contexts (e.g., working in multiagency and multijurisdictional contexts) can render these mental models less applicable to crises that present demands that differ qualitatively and quantitatively from those that characterize routine work. New mental models capable of encompassing these environmental, operational, and managerial characteristics are required to provide a viable framework within which crisis events can be understood and appropriate plans and strategies implemented to manage complex, multifaceted crises.

Mental models are crucial determinants of the effectiveness of the decision-making competencies required for crisis management. Mental models influence activities ranging from developing situational awareness to making decisions in multiagency contexts in which key decision makers are in different locations. Effective crisis management under the latter circumstance calls for the use of distributed decision making, the effectiveness of which is a function of the quality of the shared or team mental model developed to allow participants to develop a shared understanding of members' expertise, roles, and contributions and coordinate their perspectives to allow people to work on the same plan toward common goals.

The development of shared mental models facilitates implicit communication (where response is expedited through proactive information provision). Training, exercises, and simulations can be designed to develop mental models. However, given that the scale and complexity of large-scale crisis events has the potential to overwhelm individual and organizational mental models, computer-aided programs called decision support systems are often used to complement the interpretive competencies of emergency managers.

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See Also: Crisis Communications; Crisis Simulations; Decision Making Under Stress; Decision Support Tools; Disaster Drills; Emergency Manager; Emergency Public Information; Exercises, Incident Management; Post-Traumatic Stress Disorder; Pre-Crisis Training and Planning; Public Awareness and Education.

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Methods, Qualitative

Qualitative methods are the techniques or procedures used to gather and analyze data related to some research question or hypothesis in social research to interpret the meanings people make of their lives. Qualitative researchers may use different methods for gathering information or collecting data. Qualitative methods assume that understandings and theories grow "inductively" out of what is studied. The qualitative methods may include participating in the setting, observing directly, interviewing, conducting focus groups, and analyzing documents and materials. Qualitative methods are useful in exploring new issues, investigating hard-to-study groups, and determining the meaning people give to their lives and actions. Qualitative methods for data collection can be used to understand the processes involved in creating people's perceptions of their well-being and shaping how they describe their lives.

The major features of qualitative research include observations of natural behavior that capture social life as experienced by participants, the role of the social context and interconnections between social phenomena, the importance of human subjectivity and meanings, and the subjective role of the researcher. Reflexivity is an important part of qualitative methods. Geoff Payne and Judy Payne define reflexivity as "the practice of researchers being self-aware of their own beliefs, values and attitudes, and their personal effects on the setting they have studied, and self-critical about their research methods and how they have been applied, so that the evaluation and understanding of their research findings, both by themselves and their audience, may be facilitated and enhanced." In this way, the researcher is part of what is being studied.

Qualitative methods refer to several distinctive research designs: participant and direct observation, interviews, and focus groups.

Participant Observation

Participant observation is a qualitative method for gathering information that involves developing a relationship with people while they go about their regular activities. This method requires that the researcher become a participant in the culture or context being observed. In some situations, this may involve becoming a member of the community or population being studied. For example, the researcher may participate in community activities in crisis management and observe how people behave and interact with each other. This allows the researcher to gain insight into the practices and motivations of the crisis management participants and to understand their experiences. Participant observation can often require months or years of intensive work in order to become accepted as a part of the culture and ensure that observations are of the "natural" phenomenon. The researcher aims to become accepted as a neighbor or participant rather than an outsider in order to feel what it is like to be part of the group. The extent to which this is possible depends on the social context of the setting, the type of questions being investigated, and the characteristics of the participants. One of the strengths of this approach is that the researcher is able to experience and better understand the situation. The primary weakness is that it is likely to alter the behavior that is being observed. Ethical issues may arise if the participant observer misrepresents him/herself in order to be accepted by the community being studied.

Direct Observation

Direct observation is distinguished from participant observation in a number of ways. A direct observer does not aim to become a participant in the context but strives to be unobtrusive in order not to bias the observations. Direct observation suggests a more detached perspective, where the researcher is watching rather than taking part. Technology can be a useful part of direct observation. For instance, one can videotape the phenomenon or observe from behind one-way mirrors. Direct observation tends to be more focused than participant observation. The researcher is observing certain sampled situations or people rather than trying to become immersed in the entire context. For instance, one might observe student-teacher interactions under specific circumstances in a classroom laboratory setting from behind a one-way mirror, looking especially for the nonverbal cues being used. The advantage of this method is that if participants are not aware that they are being observed, they are less likely to change their behavior.

Interviews

An interview is a technique used by researchers to gather information from informants through oral communication, usually, though not always, one informant at a time. Interviewers pose questions to respondents, respondents provide answers directly to researchers, and there is an interaction that is quite personal compared to surveys.

In-depth interview: In-depth interviewing involves asking questions, listening to and recording the answers, and then posing additional questions to clarify or expand on a particular issue. Respondents are encouraged to express their own perceptions in their own words. In-depth interviewing is a qualitative method of finding out about people's experiences, thoughts, and feelings.

The goal of the in-depth interview is to develop a comprehensive picture of the interviewee's background, attitudes, and actions in his or her own terms. "Listen to people as they describe how they understand the worlds in which they live and work," as put by Herbert Rubin and Irene Rubin. There are three basic approaches to in-depth interviewing that differ mainly in the extent to which the interview questions are determined: the informal conversational interview, the semi-structured interview, and the standardized open-ended interview. Each approach serves a different purpose and has different requirements.

Informal conversational interview: The informal conversational interview relies primarily on the spontaneous generation of questions in the natural flow of an interaction. This type of interview is appropriate when the researcher wants to maintain maximum flexibility to be able to pursue questioning in whichever direction appears to be appropriate, depending on the information that emerges from observing a particular setting or from talking to one or more individuals in that setting. Under these circumstances, it is not possible to have a predetermined set of questions. The strength of this approach is that the interviewer is flexible and highly responsive to individual differences, situational changes, and emerging new information. The weakness is that it may generate less systematic data that is difficult and time-consuming to classify and analyze.

Semi-structured interview: An interview of this type involves the preparation of an interview guide that lists a pre-determined set of questions or issues that are to be explored during an interview. This guide serves as a checklist during the interview and ensures that basically the same information is obtained from a number of people. The advantage of the interview-guide approach is that it makes interviewing a number of different persons more systematic and comprehensive by focusing on the issues to be taken up in the interview. The weakness of this approach is that it does not permit the interviewer to pursue topics or issues of interest that were not anticipated when the interview guide was elaborated. Also, interviewer flexibility in wording and sequencing questions may result in substantially different responses from different persons, thus reducing comparability across interviews.

Open-ended interview: The open-ended interview consists of a set of open-ended questions carefully worded and arranged in advance. The interviewer asks each respondent the same questions with essentially the same words and in the same sequence. This type of interview may be used when there are several interviewers and the evaluator wants to minimize variation in the questions they pose. It is also useful when it is desirable to have the same information from each interviewee at several points in time or when there are time constraints for data collection and analysis. Standardized open-ended interviews enable the researcher to collect detailed data systematically and facilitate comparability among all respondents. The weakness of this approach is that it does not permit the interviewer to pursue topics or issues that were not anticipated when the interview instrument was elaborated. Standardized open-ended interviews limit the use of new questions with different people depending on their particular experiences. This reduces the extent to which individual differences and circumstances can be fully incorporated in the evaluation.

Key informant interview: A common type of individual interview is the key informant interview. A key informant is an individual who, as a result of his/her knowledge, previous experience, or position in a community, has access to information valuable for the researcher, such as insights about the functioning of members of society, their problems, and their needs. Key informants are a source of information that can assist in understanding the context of a program or project or in clarifying particular issues or problems. However, since the selection of key informants is not random, the issue of bias always arises.

Group interviews: Interviews with a group of individuals can take many different forms, depending on the purpose they serve, the structure of the questions, the role of the interviewer, and the circumstances under which the group is convened. Some forms of group interviews are focus groups, community interviews, and spontaneous group interviews. Group interviews are often referred to as focus groups or focus group interviews, and they retain some of the characteristics of individual interviews while adding the possibility for interaction among respondents.

Focus group interview: Focus group interviews are interviews with small groups of people with similar backgrounds and experience. Individuals are led in a group discussion of a topic for one to two hours. Participants are asked to reflect on the questions asked by the interviewers, provide their own comments, listen to what the rest of the group has to say, and react to their observations. The main purpose is to elicit ideas, insights, and experiences in a social context where people stimulate each other and consider their own views along with the views of others. Typically, these interviews are conducted several times, with different groups, so that the evaluator can identify trends in the perceptions and opinions. The interviewer acts as facilitator, introducing the subject, guiding the discussion, cross-checking participants' comments, and encouraging all members to express their opinions. One of the main advantages of this technique is that participant interaction helps identify inaccurate or extreme views. This requires a skilled facilitator to ensure balanced participation from all members. Focus group methods share an emphasis on discovering unanticipated findings and exploring hidden meanings, although they do not provide a means for developing reliable, generalizable results. Focus groups are useful for quickly assessing the range of opinions about an issue.

Community interview: Community interviews are conducted as public meetings in which the whole community is consulted. Typically, these interviews involve a set of questions. Once the interviewers pose a question, the group interacts to gain a consensus around an answer. Interviewing the community as a whole can provide valuable information on how well a project is working. The major weaknesses of this method are that participation may be limited to a few high-status members of the community and that community leaders may use the forum to seek consensus on their own views and preferences.

Case study: A case study is a detailed study of a single example (such as an organization, setting, or group) that is seen as an integrated social unit and must be studied holistically. Case studies have been used for many years. Robert Yin (1991) identified three types of case studies. The critical case challenges a hypothesis or theory, the unique case is selected for own intrinsic interest, and the revelatory case generates new and fresh ideas. Case studies using qualitative approaches may use various methods of collecting data, as described herein. They are self-contained and do not strive to generalize across cases.

Documentary methods: Documents provide data about the social world of the people who created them. Personal, private, and public documents can provide background information for understanding the rationale for selecting a particular site, program, or population. Researchers often supplement participant observation, interviewing, and observation with gathering and analyzing documents to better understand the values and beliefs of participants in the setting. Minutes of meetings, formal policy statements, and program documents are all useful for developing an understanding of the organization, setting, or group studied. Program documents can provide valuable information that may not be accessible by other means. For example, documents provide information that the researcher cannot observe because events took place before the study or they reflect plans that have not been realized in actual performance.

Conclusion

Qualitative research methods allow researchers to obtain a richer and more intimate view of the social world. Qualitative methods are particularly useful for research with diverse population groups because they can take into consideration the meanings and interpretations of lived experiences. The qualitative methods described in this article provide important knowledge useful for emergency management practice.

The three most common qualitative methods are participant observation, interviews, and focus groups. Each method is particularly suited for obtaining a specific type of data. Participant observation is appropriate for collecting data on naturally occurring behaviors in their usual contexts. In-depth interviews are optimal for collecting data on individuals' personal histories, perspectives, and experiences, particularly when sensitive topics are being explored. Focus groups are effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern to the cultural groups or subgroups represented. Qualitative methods generate different types of data such as field notes, audio and/or video recordings, and transcripts.

New technologies are adding to data collection strategies available to qualitative researchers, with computers, digital audio and video, and wireless communication providing new ways for researchers to connect to and interact with research subjects. These new developments offer benefits in terms of efficiency. For example, digital cameras make it much easier for researchers to use photography as a data collection method, where subjects can talk about their photos and generate new data. Carol Wang and Mary Ann Burris (1997) described "photo voice" as a method to enable people to identify and represent their community, promote critical dialogue and knowledge through discussion of photographs, and reach policymakers.

Qualitative methods can be used to improve the quality of survey results of quantitative data by strengthening the design of questionnaires and clarifying quantitative findings. Qualitative methods are typically more flexible than quantitative methods because they facilitate interaction between the researcher and the participant. For example, one advantage of qualitative methods in exploratory research is that open-ended questions give participants the opportunity to respond in their own words, rather than forcing them to choose from fixed responses.

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See Also: Disaster Assessment; Documentation; Historical Analogies, Use of; Methods, Quantitative; Risk Assessment.

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Methods, Quantitative

Quantitative research methods in the study of crises are highly unstructured. Across multiple disciplines and methods of inquiry, there exists no agreed-upon set of procedures for the length of time of data collection, sampling techniques, and analyses of data. This may be attributed in part to the novel set of circumstances under which crises arise. Because crisis events tend to be unpredictable and exist outside a laboratory setting, adherence to strict scientific methods is often unrealistic. Therefore, in the study of crisis, the quantitative scientist must be sure to articulate his/her choices to bolster credibility of the methods used to collect, analyze, and interpret data.

Highly standardized or textbook methods for sampling and interacting with research participants, such as random sampling and the random assignment of individuals to stimulus and control groups, are often impossible during or in the immediate aftermath of a crisis. Take, for instance, the restrictions that are often associated with the physical location of a crisis. In some crises, the site of a disaster may be dangerous, and data collection may involve significant personal risk. Often, crisis research is conducted a significant length of time after the event, when conditions have normalized, requiring the respondents to answer questions about prior events, introducing the issues of bias, memory lapse, or any number of types of retrieval error or threats to validity. Moreover, eliciting participation from survivors of crises is often difficult. These factors, among others, promote the use of some type of survey methodology, usually self-administered, face to face, computer mediated, telephone, or otherwise assisted. In contrast, it is nearly impossible to produce true field experiment conditions in the context of a crisis or emergency, given their complex, unexpected, and often dangerous characteristics.

Researchers are presented with further challenges in terms of sampling. For a number of reasons, it may actually be advantageous for the crisis researcher to refrain from using randomized designs. An increasingly common preference in crisis research is to collect data quickly in order to minimize memory effects or recall heuristics. The more time between an event and administration of a questionnaire, the more likely the respondent is to use imprecise methods of recall, including mapping, heuristics, and decomposition. Thus, researchers are increasingly relying on nonrandomized data that are collected as quickly as possible after an event.

Randomization and Design

Although the strongest way to control for initial differences between the stimulus and control group in experimental research is randomization, this is often difficult in crisis research. Under perfect conditions of randomization, within-group variance should be fairly consistent from group to group. Crisis research in particular is a type of quantitative research in which an argument can be made that nonrandomized designs are acceptable and should be accepted as standard. Crisis research often is not experimental; the researcher is not manipulating an independent variable to observe the effect on a dependent variable. Crisis research is closer to quasi-experimental design, in that there is less support for counterfactual inferences forcing the researcher to enumerate alternative explanations to decide which are plausible. Therefore, the belief that samples are biased because of the unfeasibility of random selection and assignment is often voiced in reviews of crisis research, but it is an argument with little merit.

It can be the case that a target population does not have a plausible frame available, or a frame that is an adequate match. The larger concerns to the crisis researcher are undercoverage and ineligible units. When elements of the target population are missing from the frame, this is known as undercoverage. When there is no population list available from which participants may be drawn, this is an issue that can be addressed in the limitations section of research. Ineligible units are a more difficult issue. These are elements that are not part of the target population but either were included in the frame or have somehow been exposed to some kind of intervention. Because they are not part of the target population, their responses introduce error into the study, and caution must therefore be taken to explain to participants the requirements for inclusion.

Accounting for Nonrandomization

Several steps can be taken to strengthen the validity of the measures in the absence of randomization. These include attempting a census, changing the unit of analysis, or carefully defining the population to which the research will generalize.

Collecting data is not the only area where a crisis researcher will encounter challenges with traditional quantitative methods. Data analysis also may pose some challenges. In the absence of randomization, the statistical assumptions associated with many popular inferential statistics are often violated. Such violations also are evident, however, in many randomized experiments and most quasi-experiments. Crisis researchers should attempt to correct for the violations of these assumptions by using appropriate statistical analyses. Nonparametric methods, for example, have the benefit of

Case Study: Using Quantitative Methods of Data Collection After Hurricanes

A series of studies conducted after Hurricane Katrina and Hurricane Ike outline the difficulties of collecting data and using quantitative methods in the study of crisis.

Nonrandomized samples were drawn because access to evacuated residents was difficult. Moreover, an accurate population frame was unavailable, as all affected residents did not evacuate and those who did choose to evacuate, did not evacuate to the same location. For instance, after Hurricane Katrina, evacuees found shelter in temporary housing, Federal Emergency Management Agency (FEMA) centers, hotels, and campgrounds. Homeless and in need of proper shelter, they were relocated to different parts of the country. Although evacuees of Hurricane Ike did not face the same challenges associated with Katrina, there still was no uniform method and locations of evacuation. In the days following the evacuations, the acquisition of an accurate sampling frame was unrealistic. For the two crises, the researchers used self-administered surveys, which were given to individuals in temporary relief shelters in more than five states (after Hurricane Katrina) or individuals in hotels and gas lines (after Hurricane Ike). Although individuals of all income levels, races, and other important characteristics were represented in such shelters, hotels, and gas lines, the authors carefully defined their target population in order to maximize their ability to generalize.

requiring fewer statistical assumptions; thus, they are able to preserve type I error rates to nominal alpha when testing hypotheses without making an appeal to population parameters. Many statistical tests are based upon the assumption that the data are sampled from a Gaussian distribution when, in practice, this is not often the case. Tests that do not make assumptions about the population distribution are referred to as nonparametric tests. For example, using the Wilcoxon-Mann-Whitney test rather than Student's *t* test, or Kruskal-Wallis rather than ANOVA, will allow the crisis researcher to provide a counterargument against the notion that an error in the data analysis has occurred as a result of a violation of the normality assumption.

Experimental Methods

Often, research on crisis management conducted using an experimental design takes place in a field setting. A field study is an experiment performed outside the laboratory, in the "real" world. The most obvious advantage of a field experiment is its practicality, and it also allows experimentation, without artificially introducing confounding variables. However, laboratory experiments have several potential advantages for crisis research.

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See Also: Losses, Quantitative Versus Qualitative; Methods, Qualitative.

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Minimum Business Continuity Objective

The term *minimum business continuity objective* (MBCO) describes the minimally acceptable level of services and business objectives that an organization plans to achieve during an incident. These objective levels are set by policy from executive management, industry regulation, and governmental requirements. Some organizations refer to the MBCO using the term *minimum service level*. The MBCO is the predetermined service or product level within time scales that are set by the organization.

Term History and Usage

Minimum business continuity objective is a term from Singapore's Technical Reference for Business Continuity Management (TR19) released in 2005 and later in the replacement standard, Singapore Standard 540. The British Standard 25999 (BS 25999) introduced a similar term, *maximum tolerable period of disruption* (MTPD).

The ISO 22301:12 (expected for release in summer 2012) is expected to replace BS 25999 and to include the term *MBCO*. As of this writing the ISO 22301:12 was not yet published.

The minimum business continuity objective is used to encourage executive management to take ownership and guidance of continuity programs. Revisiting the MBCO throughout the process of business continuity is important. As business objectives change, the MBCO should also be reviewed to ensure it remains consistent with the goals of the organization.

Determination

To establish an MBCO, the organization must identify the business activities and processes that shall not be disrupted. The identification begins with the detection of critical business functions or time-sensitive business functions. The SS540:2008 standard maintains that MBCO shall be defined after a risk analysis is performed and before the business impact analysis.

The completion of a business risk analysis and business impact analysis provides quantitative and qualitative impacts if these critical business functions are lost. The business impact analysis can provide the information needed to understand the organization and the level that it requires to maintain continuity during any incident or disruption. It is important to identify dependencies for the critical functions identified in determining the MBCO. Other key information essential in determining minimum business continuity objectives includes recovery time objectives, recovery point objectives, and minimum resource requirements. The recovery time objective of an organization is the length of time in which a business process must be restored after disruption. This time period may be referred to as the maximum tolerable period of disruption. Beyond this duration, the damage to the organization becomes critical and often beyond recoverable. It should be noted that the terms *MBCO* and *recovery time objective* are not interchangeable.

The recovery point objective is the maximum duration of time over which information data or service may be lost. This time period is also known as the maximum acceptable outage. Again, the extension of disruption beyond this time produces a severely negative impact on the organization.

The minimum resources required for business continuity and recovery are also necessary in determining MBCO. All of these objectives and standards are integral in setting the proper MBCO. Neglecting to take this factor into consideration results in an MBCO that does not provide levels of service that increase the resiliency of the business.

When setting the MBCO, it is important to understand that these objectives can be viewed in many different perspectives. For example, an MBCO can be seen as either the minimum amount of time that service can be unavailable or as the amount of time it takes to recover the service. Clarifying the objective so that everyone within the organization understands it is critical. The MBCO differs from maximum tolerable period of disruption (MTPOD) because it is based on a level of service or product rather than an amount of time within which an organization must resume normal function.

Tests and Exercises

Business continuity plans should be tested to see that the proper MBCOs have been set. Plans can also be tested to see where the organization is able to meet the MBCO and where it needs to improve. All exercises or tests shall be strategically designed with the organization's MBCO in consideration. Evaluation and debriefing of exercises and tests should include MBCO review.

Resilience can be defined as the ability of an organization, staff, or system to absorb the impact of a business disruption and continue to provide a minimum acceptable level of service. Therefore, an organization that is able to meet the MBCO is resilient. By reviewing the MBCO during tests and exercises, the resiliency of an organization can be evaluated. Tests and exercises are able to reveal impreciseness in the MBCO and promote a more accurate level of service to be set.

Examples

Typically, a finance department will have an MBCO to maintain the ability to pay accounts that are supporting emergency functions, such as recovery. Human resources departments may have an MBCO to maintain payroll during emergency response. Setting the maximum allowable duration of downtime can be an example of an MBCO. The MBCO will include the minimum personnel, resources, time, and service required. An organization may have several MBCOs. Each department may have an MBCO that supports the organization's overall MBCO. If a disruption occurs, organizations and departments need to maintain the MBCOs and continue critical service in order to recover.

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See Also: Business Continuity Planning; Critical Business Functions; High Reliability Organization Theory; Policy Setting; Pre-Impact Planning Process; Recovery Time Objective; Strategic Plans.

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Mining

Mining of minerals, stone, or other materials from the earth has been undertaken by people since prehistoric times. Broadly, mining can be divided into two excavation types: surface mining and subsurface mining. Subsurface mining receives the most attention and is best represented in the crisis management literature. Subsurface mining has a host of physical hazards associated with the mine as well as potential health and safety issues for those working in the mines.

Mining Crises

Mining crises can have short-term impacts, such as immediate loss of life, or long-term impacts. One mining crisis that occurred in Centralia, Pennsylvania, in 1962 has had a continued impact to the present day. Although there is no consensus on how the fire began, it has been burning continuously since 1962; in 1992, the state of Pennsylvania invoked eminent domain on all properties in the town, and in 2009, a forced eviction of the remaining residents occurred. Centralia is a modern-day ghost town, and the environmental effects of the fire are still unknown. Another well-known mining disaster is the Hillcrest mine in Alberta, Canada, where 189 miners were killed in 1914. The Crandall Canyon mine in Emery County, Utah, made national news when six miners were trapped by a collapse in 2007 and three rescue workers were killed in a subsequent collapse. One of the more prominent features of this collapse was the public relations problem associated with Chief Executive Officer (CEO) Robert Murray. Murray contended that the collapse was caused by an earthquake. In 2010, the Upper Big Branch mine in West Virginia collapsed following an explosion caused by improper ventilation systems that resulted in the death of 29 miners.

Mining Rescue

Because of the dangers inherent in subsurface mining, significant resources have been devoted to the study and regulation of mine safety, evacuation, and rescue. One well-known example of safety and rescue occurred in 2010 in the country of Chile. The Copiapó mining accident occurred on August 5, 2010, when a gold and copper mine near Copiapó, Chile, caved in, trapping 33 miners in a chamber some 2,300 feet underground for 70 days. All of the trapped miners survived and were rescued on October 13, 2010. It was less than six months after an earthquake and associated tsunami in Chile, and the successful rescue operation inspired Chile and the world.

Chile's government responded to the accident immediately after the first collapse. On August 7, President Sebastián Piñera and Chilean Minister of Mining Laurence Golborne cut short other official trips to visit the mine. The top officials of the Servicio Nacional de Geología y Minería de Chile (SERNAGEOMIN), Chile's mining regulatory agency, were dismissed on August 8. Supplies were sent to the survivors beginning August 23, and equipment was set up to provide voice communication with them, yet the miners were told that it would take at least four more months to be rescued. Three access strategies to reach the shelter had been implemented on August 30 and October 9; to avoid delay, a comprehensive rescue plan was adapted from previous successful rescue operations (i.e., the 2002 Quecreek mine rescue in the United States and 1963 Wunder von Lengede in Germany), and the Fénix rescue capsule was hired to extract survivors one by one.

The miners self-organized well, with a rigid scheduled routine during the entrapment. They were discovered to be still alive 17 days after the first collapse, with a note sent up by a drill bit stating that they were all well in the refuge. During the first voice contact, the miners sang Chile's national anthem to their relatives above and to the rest of the world. In addition, the expertise of the United States' National Aeronautics and Space Administration (NASA) and more than a dozen multinational corporations also committed to help the miners and their kin. Making health and safety issues the primary concern, the rescuers kept in touch with the trapped miners, not only expressing the solidarity of the whole nation but also providing regular contact with psychologists and doctors as well as religious support.

Exclusive television coverage during the rescue was provided by state-owned facitilies. The government's 24-hour nonstop coverage sent news of the rescue efforts around the world. The Chilean president and First Lady were present along with the miners' relatives and rescuers at the site. The trapped miners were brought up in the order of the skilled, weak, and strong. It took 21 hours and 44 minutes on October 13, but all of the 33 trapped miners returned to the surface. Although most of the miners were apparently in good health, all of them were taken to a hospital for further physical and psychological evaluation. The rescue cost $20 million, mainly provided by private donations, the mine owners, and the government.

The Copiapó mining accident created asuccessful rescue operation from the greatest depth ever and over the longest period of time for miners to survive in history. It has been widely discussed as a successful operation; however, the personal situations of the miners were reported to be not optimistic after the accident.

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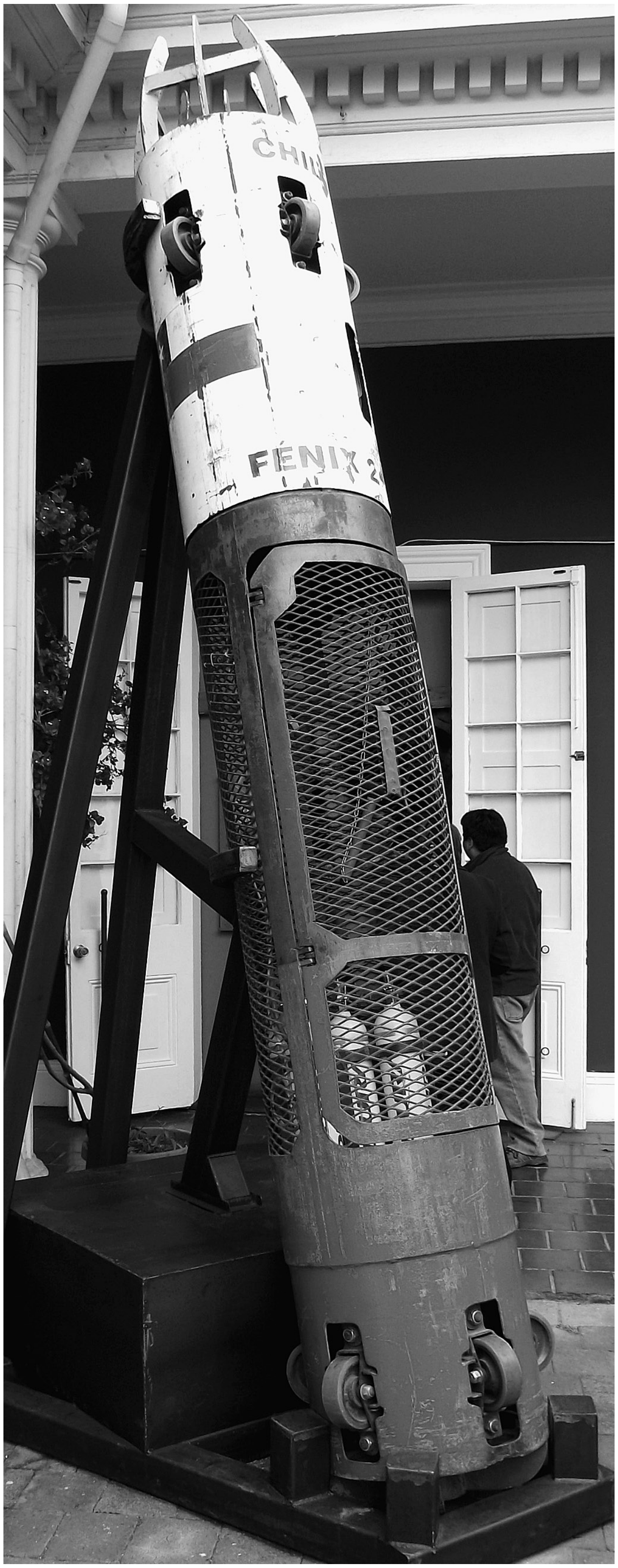
See Also: Credibility; Earthquakes; Environmental Contamination; Evacuation; Incidents Versus Crises; U.S. Geological Survey (USGS).



The Fenix 2 rescue capsule, used in the rescue of 33 miners in the San José mine near Copiapó, Chile, in October 2010, on display in the Atacama Regional Museum in Copiapó. The miners were trapped 2,300 feet underground for 70 days.

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Mirroring

Mirroring is the production of an exact copy of a set of computer data, to create a backup or for some other purpose. For instance, mirror sites on the Internet are exact copies (with functioning internal and external links and all data, images, and media) of Web sites. Mirror sites may be created to protect data in the event that something happens to the server on which the original is stored—for instance, to protect the data from damage to the server as the result of disaster—or to preserve a copy of the data in the event that the original is deliberately tampered with. Some sites now automatically mirror the Twitter feeds of all politicians, so if a controversial tweet is later deleted, a copy of it exists so that its issue cannot be denied. In other instances, government, employer, or court-ordered censorship may result in a site being taken down; creating mirror sites (typically not under the control of the original site's owner) makes it more difficult to constrain that information. For this reason, for example, there are mirrors of Wikileaks and its files, which allowed it to survive the termination of its account with Amazon. Mirror sites also provide access to information when access to an original site is restricted, a method that has been used to get around the "great firewall of China" that restricts Chinese computer users' access to many sites.

Mirror sites may also be created in order to spread out the bandwidth usage of site access; this is often done with sites hosting data to be downloaded, so that when the original site is overloaded, users may download from mirror sites instead. Such mirror sites also allow users to download from the server closest to them, enabling faster access. (Less commonly, mirror sites are created in order to "link farm" —manipulating search engine results by using the mirrors to link to each other. This is contrary to the goal of search engines, and is considered unethical.) Sites are sometimes temporarily mirrored when traffic spikes as a result of some specific event, such as recent news coverage. And there is increasing interest, as the Web steadily grows older and much of the material produced for it exists in no other form, in mirroring sites for archival purposes, just as historians produce and preserve audio and video recordings.

Sites that have been mirrored may be browsed off-line, which may be seen as an additional benefit. Some browsers are designed specifically for off-line browsing, but most popular Web browsers can be used for the purpose. Sites can also be automatically downloaded and mirrored locally (on the user's computer, not on a server) for off-line browsing later, and software has existed for this purpose nearly as long as Web browsers have; today, the software is often offered as extensions for Web browsers. Use of the Kiwix off-line Wikipedia reader allows, in essence, access to a large copyright-free encyclopedia without requiring Internet access; Kiwix has been used for schools and libraries in developing countries.

Live Mirroring and Database Replication

Live mirrors are synchronized with the original site. Data synchronization harmonizes data between two or more data sets, updating the files in all sets when one set is changed. Live mirrors are much less common and are resource-intensive—even trivial changes take some resources to synchronize—but they are the best mirrors for many of the above purposes, as well as for recovery after a loss of the original. Live mirroring is important with databases, and database replication is incorporated into many database management systems. In such systems, the master database takes the changes, which are then delivered to the slave databases; further, slave databases issue a signal confirming receipt, and the master continues to deliver the information until that signal is received, in order to ensure that the update is completed. Because both business and government are increasingly dependent on maintaining vast databases of information, database replication is an important part of emergency preparedness, guaranteeing that a copy of the database—as up-to-date as possible— survives catastrophe.

Because of its resource intensity, database replication becomes more complicated and difficult as it scales upward. At a much greater cost, and a greater complexity that requires more diligent oversight, databases can be configured for multimaster replication, in which changes to any of the master databases are rippled to others. The complexity comes from the possibility—increasingly probable, the larger the database is and the more common updates are—that changes will be enacted on more than one database at once, conflicting with each other. Replication systems for multimaster database replication are called "eager" or "lazy," depending on how they handle this conflict, and the sensible approach varies according to the type of data and its use. Eager replication systems prevent conflicts; lazy replication systems resolve conflicts. Eager systems detect conflicts as they occur, then choose between the two changes, recording one and forgetting the other. Lazy systems resolve the conflict later, creating a brief period in which the database is unclear. Further, various schemes may be established for determining how to resolve these conflicts. Seniority may be privileged, honoring the update with the earliest time stamp. Some master databases may be considered "more master" than others, such that a conflict between Database P and Database Q will always be resolved in P's favor. Different resolution algorithms may be used for different types of updates, and an algorithm may consider and weigh multiple factors. Whatever system is used for conflict resolution will always be consistent across all the databases in the system.

Live mirroring of hard drive data is also possible and is sometimes called disk mirroring, active storage, synchronous storage, or real-time storage. Disk mirroring is the simplest form of this type of storage: multiple hard drives are connected locally, and data recording is done to all drives simultaneously. The limitation here is that the drives are all kept in the same place; although this protects against hard drive failure resulting from a defect, age, or perhaps a virus, it does not protect against harm to the site. Other forms of live storage transpire across a network, so that the drives can be kept far apart; this method closely resembles master-slave database replication. Totally synchronous replication uses atomic write operations to guarantee a perfect mirror: the write operation is not complete until the write is confirmed in the remote storage drive, just as in master-slave database replication, and the master database continues to send the information until receipt is confirmed. Although safe and secure, this also slows down operations considerably when the remote storage drive is far away; even a drive five miles away results in an operation that takes five times as long. Semisynchronous or asynchronous replication systems still confirm receipt but continue the local computer's operations although waiting for it; while this opens up a risk for data loss, it also allows for mirroring that is less likely to noticeably slow down the local computer.

Replication of data can also be accomplished through distributed shared memory, a memory architecture in which logically shared address space is assigned to physically shared memory; in such a system, data are replicated across many nodes. Because data recovery is usually not the end goal of distributed shared memory, it does not protect against data loss or data corruption as effectively as synchronous mirroring.

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See Also: Alternate Site, Corporate; Backup Facility; Backup Media; Backup Strategy; Data Recovery.

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Missiles

Missiles are projectile weapons, usually with an explosive charge, that are both guided and self-propelled (smart bombs, which serve a very similar purpose, lack a propulsion system). Militaries use missiles in five basic roles, according to their launch platform and their target.

Types of Missiles

Surface-to-surface missiles are launched from the ground, whether from a stationary installation or from a vehicle or handheld mount, and are intended for other surface targets. Cruise missiles travel low to the ground, with an arc like a pitched baseball, with a long range (about 1,500 miles). Ballistic missiles travel in a high trajectory, with an arc like a volleyball serve, and come in a wide variety, depending on their range and use. Ballistic missiles launch surface-to-surface missiles with intercontinental range (over 3,000 miles).

Air-to-surface missiles are launched from an aircraft to strike ground or sea targets. Short-range missiles typically use rockets, whereas longer-range missiles use jet engines, though this is not universally true, and some Soviet-era missile designs used long-range high-speed ramjets. Very-long-range air-to-surface missiles may be fired over the horizon, which requires guidance systems in order to find the target.

Surface-to-air missiles are launched from the ground at targets in the air, typically either aircraft (antiaircraft missiles) or incoming missiles (antiballistic missiles). Antiballistic missiles may either carry an explosive charge or destroy their target through collision alone.

Air-to-air missiles are used by aircraft to attack other aircraft, and modern military aircraft rely on missiles almost entirely for their weaponry.

Antisatellite missiles would be used to attack satellites in orbit, but although a number of systems were developed by both the United States and the Soviet Union during the Cold War, they have been used only in tests.

Nuclear missiles have been a matter of serious concern since their initial development, both because the devastating power of nuclear weapons is so far beyond conventional weaponry and because the testing and development of nuclear weapons produces harmful radiation and fallout. Further, there is a tendency among nuclear states—especially the United States—to be wary of the nuclear security of upstart novitiates and the specter of nuclear missiles in the arms of a rogue state, insurrectionist general, or warlord—or worse, released to the open market and sold to the highest bidder. Nearly 70 years after the development of nuclear weapons, the concern increases with every year, as only tight controls of technology and raw materials can prevent well-motivated non-nuclear states from joining the brotherhood. The nuclear bomb, after all, is a technology older than touch-tone telephones, Ziploc bags, and credit cards; that it has remained inaccessible to most militaries for so long seems an increasingly improbable stroke of luck.

Although the first nuclear weapons were gravity bombs, dropped from an aircraft, nuclear missiles (ballistic or cruise missiles with nuclear warheads) pose the greatest threat. The Cuban Missile Crisis lasted for 13 days in October 1962, when plans to build Russian missile launch platforms in Cuba (where they could reach any American target and would not be part of the first-strike targets of American missiles) were discovered by the U.S. government. A blockade was deployed to prevent the arrival of supplies in Cuba from Russia, and historical consensus is that it was during this crisis that the two superpowers came closest to nuclear war. It was eventually resolved with an agreement that the United States would not invade Cuba and would dismantle its missiles in Italy and Turkey.

Second Nuclear Age

With the end of the Cold War, an era began that some historians call the second nuclear age, marked by the proliferation of nuclear missiles in a context untouched by the U.S./Soviet Union conflict, especially among smaller states. India had developed its first nuclear weapon in 1974, but Cold War fears were not transferred to it until the 1990s, when its unhappy neighbor Pakistan did the same, raising concerns that the countries would go to war. Unlike the Soviet Union and the United States, there were no conditions here favoring a new cold war over direct conflict—proxy wars and other rivalries would do little to sate Indian-Pakistani animosity, and their conflicts over territory were over their own territory, not dividing the rest of the world into spheres of influence. In 2004, Pakistani scientist A. Q. Khan, who had been part of Pakistan's nuclear weapons program, confessed to selling nuclear weapons technology on the black market, including but possibly not limited to North Korea, Iran, and Libya—states of particular concern because of their hostile relations with the United States. Khan was inconsistent about whether or not he acted with the knowledge and cooperation of the Pakistani government.

Khan's sales may have been instrumental in North Korea developing its nuclear weapons program. It withdrew from the Nuclear Non-Proliferation Treaty in 2003 and conducted nuclear tests in 2006 and 2009. The 2006 test was the first time that a country had announced its first nuclear test to the international community. Although the explosive force seems to have been low, the world was in a state of high tension on October 9 when China, an ally with which North Korea shares a border, alerted the U.S. government that North Korea had announced it was about to test a nuclear device. In the next few days, North Korean officials teased the possibility of war if they were subject to sanctions, and South Korea mobilized in preparation for nuclear war. The crisis was, if not dealt with, at least contained by the end of the month, at which point Kim Jong-il had apologized for the test and rejoined disarmament talks with South Korea, China, Japan, the United States, and Russia, which had begun when North Korea withdrew from the Non-Proliferation Treaty.

Despite promises to avoid future tests, a second test came two and a half years later, months after Kim Jong-il suffered a stroke, during the period when his son Kim Jong-un was preparing to eventually succeed him. This test resulted in more explosive force, but U.S. aircraft over the Sea of Japan were unable to confirm the presence of radiation—an inconclusive result given that the test was underground. North Korea tested short-range surface-to-air missiles on the same day, but those launches were probably meant to disrupt surveillance. Of more critical concern was the report a week later that North Korea had prepared intercontinental ballistic missiles—the missiles that a nuclear state would need to strike distant targets. International organizations responded with condemnation and sanctions, and North Korea threatened to resume a state of war with South Korea, putting aside the Korean War armistice. Again, little came of it. In 2012, North Korea launched a satellite that was accidentally destroyed minutes after launch; though the government, now under the rule of Kim Jong-un, claimed it was a weather satellite, most believe the satellite would have provided targeting and guidance for nuclear missile targets.

Risk of Black Market Surface-to-Air Missiles

One of the least predictable risks is that of lost, stolen, or secretly trafficked missiles on the black market. Surface-to-air missiles don't require much in the way of infrastructure to be put to use; a state or terrorist organization that can acquire them can use them. SA-7 missiles, older models than those used by the Russian military today, are readily available on the black market, though they often show their age by malfunctioning. Notable incidents of missiles being used against civilian aircraft include the Tamil Tigers shooting down Lionair Flight LN 602 in Sri Lanka in 1998 and the use of an SA-7 against an Airbus cargo plane in Baghdad in 2003. During the chaos of the Arab Spring, rebels in Libya looted an unknown number of missiles (in unknown working condition) from Moammar Gadhafi's arsenal. The NATO bombing mission in 2011 made no allowances for locating and securing the missiles, and thousands went missing. An ABC broadcast video of rebels looting weapons depots and leaving with Russian-made SA-24s and SA-7s—shoulder-fired, surface-to-air missiles capable of taking down military or commercial aircraft. These missile systems are sometimes also known as MANPADS (man-portable air-defense systems). Human Rights Watch further reported a case of dozens of missiles being transported in pickup trucks months after the bombing mission.

The U.S. government deployed 20 weapons experts to assess the situation and secure missing missiles in September 2011, and Assistant Secretary of State Andrew Shapiro reported in December that 5,000 weapons had been secured or confirmed to have been destroyed during the bombing mission, but experts estimated as many as 15,000 missiles were unaccounted for. No evidence was presented at the time that missiles had left the country, although a leader of Al Qaeda in the Islamic Maghreb (AQIM), a North African terrorist group, was quoted in a North African newspaper saying that the Arab Spring revolutions were benefiting his group because of the new availability of weaponry. Stolen missiles were seized by Algeria in February 2012, near the Libyan border.

A number of missile defense systems have been adopted by commercial aircraft, though this fact is not widely broadcast. Elta Systems Limited was contracted by the Israeli Ministry of Transportation after Al Qaeda terrorists in Kenya fired at (and missed) an Arkia Israel Airlines flight in 2002. Elta developed Flight Guard, which has been installed on an unknown number of commercial aircraft. Radar is used to detect approaching missiles, which are then countered with a deployment of flares to confuse homing missiles. Similar systems are used by military aircraft. Some transportation agencies have raised fire safety concerns with the system, and the Israeli government has explored laser-based jamming systems as an alternative. Saab Avitronics has since developed the Civil Aircraft Missile Protection System (CAMPS), which uses low-temperature pyrophoric flares to fluster homing missiles.

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See Also: Arms Control; Chemical Weapons; Failed States; Foreign Policy Crises; Interstate War; Nuclear and Radiological Weapons; Nuclear Proliferation; Nuclear Risk; Peacekeeping; Revolution; Terrorism; Weapons Trafficking.

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Mitroff's Five Stages of Crisis Management

Perhaps the most comprehensive model for crisis management is the one proposed by Ian I. Mitroff, emeritus professor at the University of Southern California who is often called the father of modern crisis management. It consists of five stages (or mechanisms, in his terms): signal detection, prevention/preparedness, containment, recovery, and learning. The signal detection and prevention/preparedness stages constitute the proactive approach to crisis management and determine the readiness of the organization to deal with a crisis. The other three stages constitute the reactive approach to crises, with activities carried out after the occurrence of a crisis.

Origins of the Model

Mitroff's five stages model is based in an older and widely cited—even today—crisis/disaster management model known as the "comprehensive emergency management" model, or PPRR (prevention, preparedness, response, recovery) model, or even MPRR, where "mitigation" replaces "prevention" without a significant change in meaning.

Mitroff recognized that in order to prevent a crisis or prepare for one, there is a need for a mechanism to be in place that detects the crisis before it manifests itself. He also saw that the crisis management models extant at the time did not include the important element of "lessons learned" from experiencing a crisis and how these could be used in the redesign of the entire crisis management process. Therefore, he proposed a more "rounded" five stages model with distinct activities to be undertaken at each stage of the crisis life cycle.

Stage 1: Signal Detection

Mitroff asserts that long before its actual occurrence, a crisis sends off a repeated and persistent trail of early warning signals that could be picked up at a time when there is still opportunity to prevent it from occurring. Although some people are skeptical about the existence of these signals and claim "hindsight bias"—the tendency, in retrospect, to overestimate the amount of available information about a threat at the time of decision making—the concept of signals that warn about an emerging crisis (or opportunity) has been widely supported in generic management literature under different terminology, such as "weak signals," "wild cards," "early indicators," "early warnings," and "emerging issues." The Institute of Crisis Management reported in a study that, in the last decade, sudden crises accounted for only between 30 and 40 percent of the crises that the world has faced; the remaining 60 to 70 percent were characterized as "smoldering" (creeping) crises that emanated warning signals that were either detected but ignored or went completely undetected.

Therefore, the real challenge for any organization is not just to recognize crises but also to recognize them in a timely fashion. In the signal detection stage, crisis management activities focus on seeking signals that might warn of a crisis and isolating these from other, more normal signals that occur in the daily operations of organizations. To accomplish this task, the organization needs to develop a crisis signal detection network consisting of technical and human detectors. Technical detectors can be devices or machines that monitor functions or data received by the organization's internal or external environment and are able to identify changes in them. Human detectors can be members of the organization or people external to the organization who have access to data pertinent to its functions and are willing to transmit these data to the organization's decision-making centers. They may be people specifically assigned to signal detection even if this may not be their full-time occupation.

The reliability of the detectors has to be regularly validated and tested, as was evidenced in major disasters such as the Union Carbide pesticide plant accident in Bhopal, India. On December 3, 1984, 45 tons (100,800 pounds) of methyl isocyanate (MIC) gas escaped from two underground storage tanks when a large volume of water entered the MIC storage tanks and triggered a violent exothermic chain reaction, forming a shallow bubble that blanketed the city within five miles of the plant. The post-accident investigation revealed that gauges measuring temperature and pressure in various parts of the plant, including the crucial MIC storage tanks, were so notoriously unreliable that workers ignored readings of pressure exceeding the acceptable limits.

The detectors' network needs to be supported by appropriate communication platforms, channels, and protocols that will transfer the captured signals to a decision-making center, usually at the senior-management level. In the case of the space shuttle *Challenger* disintegration, 73 seconds into its flight on January 28, 1986, an O-ring seal in the right solid rocket booster failed, causing a flame leak that within seconds instigated devastating structural damage to the shuttle. Prior to the disaster, a series of key memos related to structural weaknesses within the craft's design failed to reach key National Aeronautics and Space Administration (NASA) decision makers. Those memos explicitly pointed out problems related to design flaws and emphatically stated that unless the O-ring problem was rectified, a tragedy was guaranteed to occur.

Perhaps the greatest challenge at this stage is the accurate and timely interpretation of signals that, in many cases, are partial, ambiguous, or weak. A case in point is the Three Mile Island nuclear accident in March 28, 1979. Large amounts of nuclear reactor coolant escaped into the environment as a result of mechanical failures in the nonnuclear secondary system, followed by a stuck-open pilot-operated relief valve (PORV) in the primary system. The plant operators initially thought they understood the problem and applied the required technical response. Because they had misinterpreted the warning signal, the response worsened the problem. The operators were then bewildered by the interactions and were not able to stop the chain of events.

Stage 2: Prevention and Preparedness

In this second stage, prevention and preparedness are considered as one set of activities rather than two separate activities, as advocated by the PPRR model. In this view, organizations can be either "crisis prone" or "crisis prepared." Although management cannot expect to prevent all crises through planning, a "crisis prepared" organization will have better chances to completely avert a crisis. Crisis preparedness, according to this model involves systematic planning to prepare the organization to deal with a crisis, explicating critical personnel, resources, and actions to be allocated during the crisis situation. Mitroff calls for crisis managers in this stage to think like "controlled paranoids," questioning every assumption about what is normal, impossible, or absurd and "unthinkable" by taking even low probability situations into consideration and bracing themselves for the worst-case scenario. Overreaction to a possible threat, although liable to criticism, is far more acceptable than underreaction, as evidenced by the Millennium Bug threat, when many organizations made considerable investments to mitigate potentially catastrophic information systems' disruptions when the "97, 98, 99, ..." ascending numbering assumption suddenly became invalid with the turn of the year to "00." As a result, none of the apocalyptic scenarios discussed materialized, and the crisis never happened.

Crisis management plans are normally based on a "4Cs analysis" in which a potential crisis is analyzed in terms of causes, consequences, caution, and coping, where causes include the immediate failures that may trigger the crisis and the antecedent conditions that may allow failures to occur, consequences are the immediate and long-term impacts, caution includes the measures taken to prevent or minimize the impact of the potential crisis, and coping comprises measures taken to respond to a crisis that has already occurred. The coping measures prescribe the actions the organization should take in the next two stages of the crisis management model: containment and recovery.

An important but often overlooked element in this stage is the exercising and testing of crisis management plans. There are three types of exercises: tabletop exercises, typically involving senior management staff and with the purpose of introducing them to their roles and responsibilities in the execution of the plan; functional exercises, usually more complex, involving a combination of tasks played out in "real time"; and full-scale simulations involving multiple agencies with actual players in the field. These exercises are undertaken in order to gauge the effectiveness of planning and the coordination and interoperability among agencies under conditions of uncertainty as well as to identify training needs and reveal areas that need improvement or further planning for the future. The Hurricane Pam exercise that was conducted a year before Hurricane Katrina struck the Gulf Coast showed that a category 3 hurricane would cause the displacement, injury, or death of thousands of people and the destruction of billions of dollars worth of buildings and infrastructure. It also revealed that evacuations and shelters would be inadequate, roads would be blocked, the metropolitan area's sewage system would become inoperable, and much of southeast Louisiana would no longer be habitable.

Stage 3: Damage Containment

During the containment stage, crisis management aims at mitigating further escalation of the crisis and controlling the damage resulting from it. This is accomplished by attempting interventions in the source of the crisis in order to reduce its intensity and control its impact and by safeguarding mission-critical assets and infrastructure. Having well-prepared plans is crucial to preventing the damages that can result when the crisis begins to spiral out of control, since organizations usually have limited time to make an intensive crisis management plan for damage control while the crisis is unfolding. In the Deepwater Horizon oil spill in the Gulf of Mexico in 2010, British Petrolum (BP) used a large number of anchored barriers, floating containment booms, sand-filled barricades along shorelines, skimmer ships, and dispersants in an effort to protect the surrounding environment from the spreading oil. However, the company realized that the booms deployed on the first day were not enough and needed to be doubled the next day to effectively protect the shoreline.

Damage containment also involves communication efforts and actions aiming to protect the organization's reputation during the crisis. The various publics involved with the organization tend to attribute responsibility for negative, unexpected events, and these attributions shape the way they perceive it. At this stage, crisis managers need to have a clear communication strategy in order to influence their stakeholders' perception. The lack of such a strategy and the poor public communication skills of BP's Chief Executive Officer (CEO) Tony Hayward, combined with the ineffectiveness of the containment efforts of the Deepwater Horizon oil spill, cost the company more than $40 billion and a probably irreversible dent in its reputation.

Stage 4: Recovery

The recovery stage is about fixing the damage caused by the crisis. During this stage, the organization begins to enact procedures to return to normalcy, a "business as usual" state. Two important issues must be considered here. The first is to ensure "business continuity," in other words, speedy resumption and recovery of the procedures and operations that are critical for the organization's survival, and the second concerns the recovery of its linkages with all its stakeholder groups after the crisis. It is evident that, like containment, this stage is highly dependent on the second stage, "preparedness" and the planning that has taken place during it. The quicker the organization resumes its operations after the crisis, the better it will be positioned vis-à-vis its competitors. Mitroff, however, warns that, in this stage, organizations tend to focus on the physical aspects of recovery, setting aside or ignoring completely its psychological aspects, and suggests that by treating high-order needs, the organization will bounce back much faster. If it is the only player in the market struck by the crisis, it will not lose any significant part of its market share. On the other hand, a quick recovery in a market where all players were hit by the crisis offers competitive advantage and the opportunity to increase the market share.

A carefully crafted communications strategy will facilitate the reconnection with the organization's primary and secondary stakeholders. Through a combination of targeted positioning and instructional messages that will influence the organization's image and of promotional value-adding packages that will entice their business interest, severed stakeholder relationships may be mended in a short period of time and the organization will be back to normalcy.

Stage 5: Learning

The "learning" stage points to the development of crisis management–specific organizational learning, from the crisis experience and its dissemination within the organization but also to its constituencies. Normally, even if the learning acquired from a crisis situation is trivial and of limited scope, it has the potential to influence several aspects of the organization that can reduce its vulnerability to this particular crisis. In large-scale crises and disasters, learning may result in knowledge-based adaptation that impacts not only the fringes of the organization but also the core of its practices and policies. The learning stage involves not only a critical evaluation of the lessons that were learned from a crisis but also instilling a no-blame culture about the crisis or any response failures in the organization except from cases of criminal culpability and legal responsibility. Mitroff suggests that organizations need world-class "crisis learning centers" to study patterns associated with past crises (own and others'), distill critical lessons from them, and ensure that these will shape the organization's crisis planning in order to reduce the potential for future crises. FEMA's Emergency Management Institute, with more than 400 courses available to the wider crisis management community, is an example of such a center.

Stage 5 in an Evolved Model: Re-Design

In later versions of the model, Mitroff distinguishes one more stage, which he labels "re-design." Re-design stems from the learning acquired from experiencing a crisis (either directly or vicariously), concerns all the stages in the crisis management model, and is based on the interaction between stakeholder commitment, the organization's commitment to correction, and its core values.

Weaknesses of Mitroff's Model

Mitroff's model has two main weaknesses. First, it appears to raise artificial barriers between its stages when in reality these barriers do not exist. Although activities aiming at signal detection can be fairly easily distinguished from activities in the other stages, it would be rather challenging to classify certain activities in the preparation/prevention or in the damage containment stages. The temporal order of the stages also suggests that learning occurs after the crisis is over, whereas in reality knowledge is acquired in each one of the stages. Similarly, signal detection activities feed with information not only the preparation/prevention phase but all the phases of crisis management, and in the same vein, re-design concerns the entire model.

Although Mitroff incorporates the element of learning in crisis management, his model ignores risk assessment, appears to downplay the importance of the organization's vulnerabilities, and is only concerned with crisis signals. He argues against a risk assessment approach because it leads management to construct models of crisis occurrence probability, which, based on historical data, rank crises in high and low probability. He contends that the fallacy behind this procedure is that it is precisely those crises that have *not* occurred that need to be considered. However, elsewhere he advises organizations to form a crisis portfolio covering all "crisis families" and recommends that organizations should prepare for at least one crisis in each crisis family. As this task can only be performed following a risk assessment approach, the truth must lie somewhere in the middle.

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See Also: Blame, Politics of; Business Continuity Management; Crisis Communications; Crisis Simulations; Critical Business Functions; Damage Containment; Disaster Drills; Early Warning Systems; Exercises; Preparedness; Prevention; Recovery; Risk Assessment; Simulations; Stakeholders; Warning; Y2K Bug.

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Mobile Recovery Site

Mobile recovery sites provide the various types of outside support needed for local on-site management of recovery efforts. Types of disaster aid provided in part through mobile recovery sites are individual assistance, public assistance, and hazard mitigation related to disaster recovery. Information and communications technology, operations, logistics, energy, security, and life support can be provided. Mobile recovery site providers include federal, state, and local governments; volunteer and nonprofit agencies; private-sector businesses; and international governmental associations and nongovernmental organizations (NGOs).

Mobile recovery sites provide needed recovery services when local facilities are unavailable because of extensive damage, inaccessibility, or conflict situations or are overwhelmed by the extent of the disaster. They also ensure faster continuity of services or operations. Many mobile disaster sites may be utilized in the convergence of relief and recovery assistance that tends to flood the area in the initial days and weeks following an emergency. Their mobility allows for rapid deployment. Forecasted disasters such as hurricanes that provide advance warning even allow mobile sites to be pre-stocked and pre-positioned. Mobile recovery sites can include trailer, truck, aircraft, or tent-based operations that are completely self-sustaining and operational in a challenging environment.

Mobile recovery sites share many common features regardless of their origin or service population, including specialized equipment and trained personnel. Operational support provides temporary office and meeting spaces. Energy support can provide access to electricity through various types of portable generators as well as diesel fuel. Information and communications technology support provides mobile telecommunications or reestablishes existing telecommunications. Life support, heating, ventilation, air conditioning, restrooms, kitchens, and other amenities aid comfort, while site and data security aid safety.

Individual Assistance

Mobile recovery sites are utilized in recovery efforts aimed at individual disaster victims. The locations of mobile recovery sites dedicated to individual or business owner assistance, often including toll-free telephone numbers, are publicized through the mass media to promote public awareness and ease of accessibility. Mobile unit staffing can include damage and claims inspectors, medical personnel, bank and loan officers, government officials, military agents, crisis counselors, security officials, legal aid workers, and volunteers.

Life support can provide potable water, ice, and hot meals or military-style meals-ready-to-eat (MRE). Clothing and laundry services may also be provided. Distribution of tarpaulins, sand bags, lumber, and other items helps secure damaged property against further losses. Temporary housing may be provided through shelters, tents, trailers, or rental and hotel assistance. Mobile medical units assist the sick or injured and help prevent the spread of disease. Victims may also receive information and assistance in locating and applying for available assistance or counseling.

The U.S. Federal Emergency Management Agency (FEMA) employs Mobile Disaster Recovery Center units to provide readily accessible aid to disaster victims. Personnel include federal and state disaster program representatives, recovery specialists, and loan officers from the U.S. Small Business Administration. Disaster victims may register for federal and state disaster assistance or check the status of their application, have their questions answered, or receive referrals to other services. Other mobile federal government services include immediate and long-term housing or rental assistance, such as applying for monetary assistance for hotel stays or applying for temporary FEMA housing trailers. Funding assistance for home repairs may also be available.

Public Assistance

Public assistance encompasses federal aid to state or local governments and emergency managers for short- and long-term recovery. Examples include emergency services and public protection, debris removal, public property repair, loans, and support for essential government functions and infrastructure rebuilding. Governments may also provide aid for the mitigation of future hazards in the course of disaster recovery, such as the relocation or retrofitting of damaged structures.

Mobile recovery sites support emergency responders and search-and-rescue personnel and assist with initial damage assessments in the immediate aftermath of emergencies. They also provide state and local authorities with any necessary support such as temporary office and conference space, telecommunications and information technology services, fuel, power generation, and life support. Security services ensure on-site security of personnel and equipment, building safety, user access, and communication with the military and local law enforcement agencies.

Mobile recovery sites aid in data collection and analysis, message distribution, action tracking, and the preparation and submission of situation, operation, and event-specific reports and briefs. Telecommunications operations may have to establish or reestablish connectivity with government or public networks, connect facilities both within and outside the disaster area, or install needed computer, telephone, or video devices and networks. Radio networks provide both local and long-distance communication. Transmissions systems include satellite, high-frequency, and line-of-sight (LOS) microwave systems. All of these mobile systems allow for increased interagency coordination.

The Federal Emergency Management Agency provides a variety of mobile-based recovery services through the Response and Recovery Directorate's Mobile Operations Division. The division oversees five Mobile Emergency Response Support (MERS) units situated within different geographical regions designated by FEMA as well as the Mobile Air Transportable Telecommunications System (MATTS). MERS detachments are located in Maynard, Massachusetts; Thomasville, Georgia; Denton, Texas; Denver, Colorado; and Bothell, Washington. MATTS is located in Berryville, Virginia. MERS and MATTS support local disaster facilities such as disaster field offices and field operating sites.

These mobile resources are deployed to support local and state authorities whose capabilities are inadequate to meet recovery needs. State governors must request federal assistance. The president determines what kind of federal assistance will be granted. An Emergency Declaration provides limited short-term assistance, whereas a Major Disaster Declaration provides extensive long-term assistance. Funding for federal mobile recovery sites represents a mixture of state and local funds as well as the President's Disaster Relief Fund, managed by FEMA and other federal aid programs. MERS and MATTS are ready for immediate deployment in times of emergency, often with preloaded supplies and equipment on standby.

Preloaded MERS deployment packages are the Quick Reaction System (QRS), the Emergency Response Team Advance (ERTA), and the Emergency Response Team Support (ERTS). The QRS provides 13 personnel, four-wheel-drive vehicles, and support equipment for a 72-hour period. Equipment includes satellite terminals, cell phones, laptops, radios, generators, and life-support needs. ERTS and ERTA provide preloaded heavy-duty trucks containing life-support, medical, and safety supplies to support up to 100 people for a 10-day period as well as office equipment, tools, and lumber.

MERS equipment and assets may be driven or airlifted to the disaster sites. MERS detachments deployed to recovery sites deliver support to local buildings designated as disaster field facilities. MERS detachments are self-sustaining in terms of logistics, operations, and telecommunications capabilities in case a disaster field facility is not usable. The MERS detachment vehicles are located near the disaster field facility, usually in an adjacent parking lot.

FEMA can also deploy an Emergency Operations Vehicle (EOV), an expandable trailer encompassing emergency response and recovery needs. An EOV contains office workstations, a conference room, an operations and communications center, and amenities such as a kitchen and restrooms. Information and communications technology provides telephones and computers with voice and data switch, video teleconferencing capabilities, local and wide-area networks, and HF, VHF, and UHF radios equipped with telephone interface capabilities. Self-contained generators supply the necessary power.

Federal Emergency Management Agency (FEMA) Deputy Administrator Richard Serino (left) talks with an employee in FEMA's mobile emergency response support/systems (MERS) vehicle at the emergency operations center in Hartford, Connecticut, September 1, 2011. Hurricane Irene lashed the state on August 28, 2011. The vehicles, which are strategically located in disaster-affected areas to support emergency response communications needs, provide self-sustaining telecommunications, logistics, and operations support elements.

Private Sector

Mobile recovery sites have become globally popular in the private sector as part of risk management, business continuity planning, and disaster recovery strategies. The transportability of mobile recovery sites allows businesses to reduce the impact of emergencies and speed the resumption of normal business operations by bringing recovery operations to the local emergency site. Mobile recovery sites may be vendor supplied or purchased through a commercial retailer.

Most mobile recovery sites are located near the normal business site to speed the transition of operations, provide easier employee access, and minimize or eliminate disruptions in customer service. Such sites are generally enclosed spaces that provide uninterrupted power, using generators if necessary. Most mobile recovery sites are able to be custom configured to suit individual company needs. Heating and air conditioning systems, restrooms, multistation workspaces, and other amenities provide employee comfort. Proximity to the original business site and security help ensure employee safety.

Information and technology resources can include data centers, preloaded hardware and software, computing facilities that work in extreme conditions, access to the Internet and e-mail, preconfigured replacement systems, and network expandability. Automatic data replication between the normal business site and the mobile recovery site is also available. Communications resources can include multiple telephone and fax connections and voice over Internet protocol (VoIP) capabilities. Technical expertise may also be provided.

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See Also: Business Continuity Planning; Disaster Recovery; Disaster Recovery Life Cycle; Federal Emergency Management Agency (FEMA).

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Multiple Disaster Problem

A hurricane causes flooding, power outages, and widespread wind damage. An earthquake leads to an electrical fire that spreads through a neighborhood blocked off by quake damage. A tsunami causes a chemical spill. All of these are examples of multiple disasters striking at once. Within a 10-year period beginning in 2001, there were three catastrophic instances of simultaneous multiple disasters. The terrorist attacks in the United States on September 11, 2001, involved attacks on multiple sites, as well as numerous interrelated problems at those sites. Hurricane Katrina in 2005 resulted in the failure of New Orleans’s levee system, such that flooding was caused by two distinct sources, and structural damage and transportation around the city became that much more complicated. In 2011, the Tohoku earthquake and tsunami in Japan led to multiple nuclear meltdowns and releases of radioactive material at the Fukushima Daiichi nuclear power plant over a series of days. The problem of multiple disasters such as these has become of increasing interest in the field of emergency management, enough so that in 2012, the Philippines held a nationwide simultaneous earthquake and fire drill to increase preparedness for the country’s most likely multiple disaster scenario.

The problem of multiple disasters occurring in close proximity is one often caused or exacerbated by unusual trends in weather. The 21st century has seen uncommon weather patterns unlike any in modern meteorological history, including numerous historical records broken, in some cases repeatedly. The patterns have not been of a single type: A given region might experience both drought and floods in consecutive years, both historically mild winters and historically snowy ones, or cold, rainy summers and hot, dry summers. The effects of these unusual weather patterns are not yet fully understood and involve much more than simply the weather on a given day: The mild winter in the Northern Hemisphere in 2011–12 (after the extremely cold winters in 2009–10 and 2010–11), for instance, led to a premature spring blooming for some plants, which then lost their blossoms to frost or freeze. The commercial pie cherry crop for 2012 was decimated as a result. Two years earlier, citrus crops in the United States had similarly been decimated by an unusually cold autumn and icy rain that crushed fragile fruit. The mild winter of 2011–12 also led to lowered river and lake levels the following spring, because they were not fed by spring thaw. This, in turn, affected the life cycles of numerous wildlife: Migrating birds didn't migrate as far south, which depleted populations of their prey species in northern climes and ballooned populations of their prey species in southern ones; mosquito populations increased in many parts of the country and were discovered to carry the West Nile virus in the Midwest and New England.

One of the proximate causes for these weather patterns was the change in the position of the jet stream, the air current driving the Northern Hemisphere weather system. In the past, changes in the jet stream have been responsible for extreme El Niño (warming in the Pacific Ocean) and La Niña (cooling in the Pacific Ocean) events, and contributed to the extreme drought of the Dust Bowl in the 1930s, though the most direct cause of the latter drought was the human-made alteration of the prairies. Since 2007, the jet stream's path across the United Kingdom has been at an unusually low latitude—10 degrees further south than usual, at 50 degrees north latitude near the English Channel, instead of 60 degrees north on the other side of the British Isles. This has occurred in spite of the observed trend in previous decades of a steady if slow northward climb of the jet stream.

The extreme negative phase of the North Atlantic Oscillation—the fluctuation between the Icelandic low atmospheric pressure and the Azores high, in the North Atlantic Ocean—had driven the extreme cold of 2009–11, bringing cold Arctic air to regions that rarely experienced it, but over time it dragged the jet stream south, accounting for the extremely mild 2011–12 winter (and perhaps another mild winter to come). An extreme negative phase of the North Atlantic Oscillation during summer has frequently brought on North American heat waves in the past, and this correlation held true for the summer of 2012, when heat records were broken throughout most of the United States, with July 2012 being the hottest month in American history.

Climate-Related Disasters

Though the term *global warming* is accurate because of the steadily increasing average annual temperature, "climate change" has come into stronger favor because this term more explicitly encompasses atypical weather patterns that include both unusual warmth and unusual cold. Although the vast majority of scientists do not doubt the reality of climate change, and there is little uncertainty as to its anthropogenic origins, predicting the specific outcome decade to decade, much less year to year, of these changes to the global weather system is a much less certain matter. The general indication of models, upheld by the observed extreme weather of the 21st century to date, is that cold winters will become less frequent, but more severe when they do occur.

One of the results of these weather patterns has been that American communities have faced unaccustomed disaster challenges. Schools have closed for record lengths of time in southern communities, which are not accustomed to including snow days in their school calendars, as is done in the north. In addition, southern communities are populated by drivers inexperienced in driving in snow and ice conditions, increasing the per-driver rate of vehicular accidents and decreasing the competence of emergency responders; these areas also possess too little equipment to adequately handle the weather-related challenges in a timely manner. Even in Virginia—far enough north that snowfall of some amount is a normal occurrence—there were too few plows to adequately plow the roads during the 2009–11 winters, resulting in lengthy school closures as crews worked laboriously to finish plowing days, even a week, after the snow had stopped falling. What would have been a single day's closure, or even a half day, in parts of the north turned into a loss of five to six school days. The economic toll is significant: school closures result in parents staying home from work (and a reduction in income for those who are paid by the hour), and unsafe roads reduce the amount of shopping and other spending that people are likely to make.

While more than half of the United States experienced drought conditions in 2012, leading to the largest increases in corn and food crop prices in many years and the strong possibility of a food access crisis among the working poor and the unemployed, some parts of the country were already drought-prone and suffered more than usual. In New Mexico, California, and Texas, drought does not just mean water rationing and agricultural difficulties, as it does in the drought-prone Carolinas; it also means a serious increase in the risk of wildfires. Severe wildfires raged in Colorado in the summer of 2012, and parts of Texas already ravaged by fire in recent years experienced them again. In northern New England and the Canadian borderland, the woodlands faced their first serious wildfire threat in recent memory, with fewer resources on hand to combat it than in those areas where wildfire management has become a way of life.

Disaster and Compassion Fatigue

These multiple disasters tax resources—not only the tangible resources of money, labor, and equipment needed to deal with disasters and their aftermath, but also the emotional resources of the population. One of the largest factors in the human toll of Hurricane Katrina was the number of people who simply didn't evacuate or who waited until the mandatory evacuation order to do so. Some of them wanted to evacuate and were unable to, but many, by their own admission, remained in the city, or waited until the mandatory evacuation order was given, because there had been so many "false alarms" in the recent past, and this delayed reaction contributed to the problems of the Katrina evacuation. None of the hurricanes that occurred in the region in the previous 10 years had been serious, certainly not as serious as Katrina, and in the past, many people had undergone the expense and stress of evacuating only to see a storm sputter out before it hit land, or hit somewhere far from home. Most people in the Gulf South have at least one story about fleeing an area where a storm was supposed to strike, only to have it strike the place to which they fled. This sort of disaster fatigue, experienced by the potential victims of disasters and leading to a reduction in diligence, is matched by compassion fatigue, which has a serious effect on charitable giving—and perhaps on voting, when the matter pertains to preventing or dealing with the aftermath of disasters. Major disaster events like the 9/11 terrorist attacks, Hurricane Katrina, and the Japanese tsunami were followed by media exposés and cynicism about the handling of charitable donations and the inefficiency of many responding agencies; this, in turn, leads people to be less willing to give to the Red Cross or other charities, or less willing to volunteer.

Weather changes have altered the frequency of natural disasters and upset the balance of crisis frequency to resource availability at a time when the United States, along with many other areas of the world, is experiencing a severe financial crisis that constrains available resources and economic flexibility. Hurricane Katrina permanently reshaped the demographics and economy of the city of New Orleans, Louisiana, and there is a good chance the city's odds of survival would have been seriously diminished had it not been of great enough cultural significance to encourage resettlement by newcomers who could afford to engage with the rebuilding effort: Indianapolis, Indiana; Cheyenne, Wyoming; or Albany, New York, might not have been able to appeal to such sentiment. Success stories growing out of the crisis—like supermarket chain Winn-Dixie's ability to escape bankruptcy because of insurance payments made after its storm-related damages—were uplifting but rare.

"Packages of disaster" are multiple disasters that occur with interrelated causal factors, such as the economic problems faced by New Orleans after Katrina and what many medical professionals described as an epidemic of depression, as the city became the greatest per capita consumer of antidepressants. Haiti's 2010 earthquake struck near enough to the capital that for a time it was, in essence, a failed state; the country was not resourceful enough or prosperous enough to have an effective continuity of government planning in place, and rebuilding the country's infrastructure would arguably have been impossible—in any time frame—without the intervention of international agencies and foreign labor. The situation was worsened by a subsequent cholera epidemic, both a symptom of and a contributing cause to the country's post-earthquake chaos. The Haiti situation raised what should be the most frightening question for emergency management professionals: What happens when a major disaster event, or multiple ones, causes the breakdown of society?

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See Also: Agency Notification and Mobilization; All-Hazards; Avalanches and Landslides; Contingency Planning; Continuity of Government; Coordination; Crisis Management, Emerging Trends in; Crisis Simulations.

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Mutual Aid and Assistance

Organizations develop operational capacities that meet their normal operational conditions, which usually serve them well, optimizing their use of resources. It is not uncommon to have potential to develop a limited surge capacity, if all organizational resources are brought to bear simultaneously, but that potential may rarely be exercised. However, during a significant crisis, it will be common for resources to be exhausted, making external assistance a prerequisite of success. To acquire external assistance in a crisis, organizations rely on mutual aid. *Mutual aid* is an umbrella term covering differing forms of interorganizational relationships. Although they have differing names and take differing forms, they have similar benefits that serve the needs of effective crisis management.

Benefits of Mutual Aid

The greatest benefit of mutual aid is the ability to enhance or expand response capacity through a cost-sharing, collaborative approach. Within this context, "expanding response capacity" is defined as acquiring larger numbers of the resources already available, while "enhanced capacity" is defined as acquiring specialized resources. Illustrative of the former is a request for additional fire engines or public works crews, while an example of the latter is a team specially trained and equipped to provide medical response to a mass casualty incident. In either instance, the benefit is that the locality does not have to develop and sustain a response capacity beyond its normal operational needs, limiting its costs by sharing the expenses with others. A subsidiary benefit of mutual aid is that it can serve to create and maintain open communications channels between organizations and localities, supporting collaborative endeavors in other areas of governance.

Basic Mutual Aid Practices

In emergency management, the oldest model of mutual aid was developed in the fire service. Individual fire departments needing assistance would request aid, when needed. If assistance was available, it would be given, with the understanding that this created a reciprocal agreement for assistance to be returned at some time in the future. These approaches were largely unwritten, with no concern for legal constraints or interoperability. Although examples of this can be found back to colonial times in the United States, it would be questionable to state that all mutual aid developed from that model, with a high probability that there was concurrent development of the practice, given its simplicity and readily identifiable benefits. Generally, this approach works well but may not be as effective or as rapid as might be desirable to support efficient and effective operations, depending on the distance assisting resources have to travel, the rapidity of the request process, and the degree to which agencies have trained together prior to a crisis.

Mutual aid has evolved over time. One major leap was the development of automatic aid. Instead of waiting to be requested, the closest emergency units will respond, regardless of jurisdictional lines. This often involves a shared dispatching system to facilitate the process. Automatic aid recognizes the need to provide the highest levels of customer service, responding with the closest units available, regardless of jurisdictional lines. Over time, this approach engenders a recognition that organizations in emergency management are interdependent, contributing to efforts to increase interoperability through shared communications, common training, and consistent practices. A notable example of this is the shared tactical policies used by the cities and counties in northern Virginia, where operational policies and practices have been standardized across a number of fire departments.

Regional Teams

Basic mutual aid practices provide for enhancing or expanding response capacity. However, those practices are dependent upon a needed capacity being available in the local area. In most instances, there will be sufficient local resources to expand response capacity. However, this has sometimes been problematic when enhanced capacities are needed, such as teams that provide specialized services. A hazardous materials response team can be very expensive for an individual jurisdiction to create and sustain, especially if it is to be equipped to handle all types of hazardous materials emergencies, regardless of severity or scale. Developing a collaborative approach to such functions helps spread the costs, minimizing the impact on the budget of any single jurisdiction while concurrently minimizing the potential for the development of redundant services within a region.

Assistance Compacts

An assistance compact is essentially a large-scale mutual aid program, usually at the state or national level. Such compacts do not support an automatic response capacity but instead provide a breadth and depth of resources often unavailable at the local level. As a general rule, these compacts can only be accessed by an Emergency

Case Study: Examples of Mutual Aid in Hampton Roads, Virginia

The Hampton Roads region in southeast Virginia is home to 16 counties and independent cities as well as a number of military installations. There are a number of mutual aid agreements in place, including the following:

Interlocal Mutual Aid
Each local government has mutual aid agreements in place with neighboring jurisdictions and military installations, supporting mutual aid for common emergencies such as fires. Depending on the localities, the assistance may be automatic or by request and may be used for responding to the emergency or providing coverage when response units from the requesting city or county are otherwise engaged.

Hampton Roads Region
There are a number of regional emergency response teams in the region, comprising members from local agencies, supported by local or state governments, including the following:

- Hampton Roads Marine Incident Response Team
- Hampton Roads Metropolitan Medical Response Strike Team
- Peninsula Hazardous Materials Response Team
- Southside Hampton Roads Hazardous Materials Response Team
- Tidewater Regional Technical Rescue Team

Statewide
All of the cities and counties are signatories of the Virginia Statewide Mutual Aid Plan, pledging to be available to provide assistance to other localities within the Commonwealth of Virginia.

Operations Center (EOC), and then only after a disaster has been declared, but there are exceptions from state to state. At the national level, the Emergency Management Assistance Compact (EMAC) can only be accessed if a governor has declared a state of emergency and has exhausted all state resources, but there is no requirement that the crisis have a Presidential Disaster Declaration.

When an EMAC request is desired, a local EOC will request assistance from a state EOC, and the state EOC will request assistance from the Federal Emergency Management Agency (FEMA), with the specific FEMA organizational unit differing depending on the scale and timeline of the disaster. The request will include specifics as to the resources needed, as well as a projection of how long the resources will be required. The requests are funneled up to a central functionary that shares these requests with EOCs across the state or the nation. State EOCs contact local EOCs with the requests. After discussions at the local level concerning which resources can be shared at that time, the local EOCs will respond to the state EOCs with the types and amounts of aid they are willing to provide. This information is routed to FEMA, which decides which offers to accept. This information is then funneled back to state and local EOCs. Based on the federal system of government, this model can be somewhat cumbersome to initiate after a disaster. For a large-scale event such as Hurricane Katrina, where resources may have to come from great distances, the initial units requested from the EMAC may take a week or more to arrive. However, once the system is implemented and ongoing, mutual aid resources arrive and depart in a steady flow, with no negative impact on operational staffing.

Non-Response Collaborative Agreements

Although mutual aid is normally associated with emergency response, it may take other forms. Illustrative of this, in many areas of the nation, smaller agencies share emergency dispatching or training facilities. In much the same manner as response-oriented mutual aid, this helps spread costs among a number of jurisdictions, eliminating needless redundancy. Additionally, some localities have banded together to purchase vehicles, specialized equipment, disposable goods, or protective clothing, which, based on economies of scale, helps reduce prices for all those engaged in these types of programs.

Contracts

Some local governments use contracts to acquire expanded or enhanced response capacity. For example, some unincorporated areas of a county may contract for municipal services, often for a token fee of $1 per year. Others will contract with private emergency medical service providers for a surge capacity in ambulances. This is certainly an effective approach in some situations. There is some question as to whether it is truly a mutual aid approach, as there is no expectation of reciprocity. Regardless, it can be an effective and efficient means for governments to fill potential gaps in emergency response capacity.

Essential Components

When developing a mutual aid program, several elements need to be addressed. First, the programs will only succeed if there is support from the upper tiers of the organization, which normally requires that those in the upper tiers of each organization recognize the need for external assistance and are willing to act in a collaborative manner. Second, the programs need to address operational issues, such as how to facilitate personnel from differing agencies working together. The National Incident Management System (NIMS) provides a framework for developing an effective interorganizational response, which includes such features as inter-operational communications and a robust disaster exercise program. However, because of variances in specific training and the equipment used by differing agencies, special consideration may be needed during the incident to address these issues. Third, the program must clearly identify when and how the system is to be used. Clarifying this proactively will reduce potential problems when individual localities seek to request mutual aid. Last, the programs need to address the more mundane issues associated with mutual aid, such as the legal and human resource management aspects.

Public organizations derive their power from their enabling documents, including constitutions at the federal and state level and city or county charters at the local level. The authority of public officials, as well as of many private-sector individuals, is based not only on such documents but also on state licenses. An important facet of any mutual aid agreement is the recognition that mutual aid partners coming into a state or locality based on a mutual aid request are acting as agents of that state or locality, will be acting as agents of the requesting party, with all licenses and authorities granted. This is a critical issue in some disciplines such as emergency medical delivery and law enforcement. Without this being addressed in the agreement, medical personnel may be effectively practicing medicine without a license, and law enforcement officials have no more authority to carry arms than the average citizen or to detain personnel beyond the statutes for a citizen's arrest. Last, a mutual aid agreement should consider issues such as employee compensation, reimbursement for services provided, and workers compensation.

Although most agreements simply state that each agency will compensate its own employees and provide for their workers compensation, as well as note that there will be no reimbursement for costs, agreements differ depending on the area and the type of team. For example, many regional and national emergency response teams are supported by the state or federal governments. In many situations, those teams may provide for limited reimbursement of funds. Regardless of the approach, an essential component of a mutual aid agreement is a proactive understanding of such matters, which will contribute to less confusion during and after the time a mutual aid request is fulfilled.

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See Also: Collaboration; Emergency Management System; Emergency Responders; Incident Management; Incident Response; Interdependence; National Incident Management System (NIMS); Operational Readiness; Pre-Crisis Training and Planning; Preparedness; Resource Management; Response.

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Nanotechnology

Nanotechnology is the field of science that explores the development and functional application of atomic-scale materials and devices. The prefix *nano* refers to the scale on which the research and development is being performed: between one and 100 billionths of a meter. The physical properties a material may have on the visible scale may be very different from the properties it exhibits on the nanoscale. Inert materials may become reactive, opaque materials may become transparent, and so forth. Using nanotechnological methods, scientists can manipulate these properties to control the structure, weight, strength, solubility, and chemical reactivity of a material. Nanotechnology also allows atoms to be carefully manipulated and arranged to produce entirely new molecular structures. Nanoproducts have seen broad application across many disciplines of science, including physics, organic chemistry, and materials science. Beyond scientific applications, nanotechnology has also significantly impacted commercial manufacturing, medicine, and information systems. The creation of novel materials and devices through the use of nanotechnology has raised ethical, environmental, and economic concerns, and debate about the future of nanotechnology (including its risk and regulation) continues.

Origins and Fundamentals

The concept of constructing molecules with atomic-level control originated as early as the 1950s, when physicist Richard Feynman speculated in public lectures in 1959 about the ability to build molecular structures, atom by atom. Advances in microscope technology in the 1980s, including the development of the atomic force microscope (AFM) and the scanning tunnel microscope (STM), made possible the physical observation of individual atoms and the continued development of nanotechnology as a discrete science. The field continued to develop throughout the 1990s and 2000s and saw the emergence of nanoscience subspecialties, including nanophotonics, nanoionics, and nanomechanics. The National Nanotechnology Initiative (NNI) was created in 2000 to provide coordination of U.S. federal nanotechnology research, and in 2003 the passage of the 21st Century Nanotechnology Research and Development Act authorized funding for the project. Participation in the NNI is broad and includes both research and regulatory agencies such as the Departments of Homeland Security, Transportation, and Agriculture; the National Science Foundation; the U.S. Patent and Trademark Office; the National Institutes of Health; and the Nuclear Regulatory Commission.

Two major approaches are considered fundamental to nanotechnology research. The "bottom up" approach involves the manipulation of the specific chemical properties of atoms to synthesize desired molecular configurations. Certain molecular structures, although thermodynamically unfavorable or unlikely to occur naturally, can be generated with nanotechnology. In turn, these complex molecular assemblies may themselves manufacture or assemble nanoproducts, essentially creating molecular factories. This is known as "molecular manufacturing."

The second approach guiding development of nanoproducts employs a "top down" methodology. Certain mechanical and physical properties become more pronounced as a material is scaled down. Nanoproducts are fashioned from larger materials, often without atomic-level control. Ultraprecision tools are used to shape, mill, and reduce a material down to a specific size to elicit desired effects. For example, aluminum, a relatively stable material on the visible scale, can be milled down to the nanoscale, where it becomes potently combustible.

Applications

Applications for nanotechnology can be found in many disciplines, from scientific research to human services to commercial manufacturing. Not only has nanotechnology facilitated improvements in current designs and processes, but it has also allowed the development of completely novel devices and products. The domain of materials science has been most significantly affected by the nanotechnological developments, and the capabilities of the field have greatly expanded. Materials can now be made lighter, stronger, more flexible, and more durable. Nanoscale processes and materials are currently in use in more than 800 commercial products, from sunscreens to body armor. These advances have also translated the fields of electronics and information systems as well as environmental science and sustainable energy. Computer processing chips, semiconductors, and consumer electronic goods have become faster, more powerful, and more portable, and cleaner fuels and pollution remediation agents have been developed. Nanotechnology has also shown promise for revolutionizing the field of medicine. Current research suggests that nanotechnological applications could assist in the early detection of disease, the development of personalized medicine, improving the sensitivity and accuracy of diagnostic tools, and the development of multifunctional pharmaceuticals and therapeutics. For instance, the antimicrobial properties of nanoparticulate silver are being evaluated for use in bandages and medical equipment.

Risk and Regulation

Because nanoproducts are invisible to the unassisted human eye, their presence, persistence, and impacts can be difficult to document and control. For instance, nanotechnology processes could be used to enhance biological, chemical, and nuclear weapons or to make them undetectable and untraceable. Additionally, significant legal and ethical concerns are raised by the use, cost, and trade of nanoproducts. The potential threats of nanotechnology to the environment, human health, and public safety have led to federally coordinated research on the subject. NanoEHS (environmental, health, and safety) research has seen a surge in federal funding and is currently exploring methodologies to mitigate both intentional and unintentional consequences of the applications of nanotechnology. The NNI currently recommends a risk management process that outlines risk assessment, hazard identification, and exposure control across the entire nanotechnology product life cycle. A nanotechnology-specific regulatory framework has yet to be established, with nations including the United States choosing to manage potential risks through existing regulatory bodies, such as the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA). Labeling of nanomaterials in consumer products is currently not required; however, some manufacturers voluntarily list their products in databases maintained by the Project on Emerging Nanotechnologies (PEN) and the International Council on Nanotechnology (ICON).

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See Also: Biological Weapons; Chemical Weapons; Crisis Management, Emerging Trends in; Manufacturing Risks; Nuclear and Radiological Weapons; Nuclear Risk; Sabotage; Terrorism; Threat Detection.

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NatCatSERVICE (Munich Re)

The need for accurate, precise, and reliable hazard loss information is imperative for stability and growth not only within civil society but also for public and private-sector enterprises. Knowledge of past catastrophic impacts plays a vital role in planning for development into the future and for understanding the possible outcomes related to ever-increasing encroachment into the world's hazard zones. To support this need, insurance and reinsurance entities have created vast enterprises aimed at identifying, understanding, analyzing, and contextualizing risks, impacts, and future threats. A leader in this development of catastrophe research and analysis, Munich Re's NatCatSERVICE provides online access to high-quality loss information and data for risk evaluation and assessment as one of the supporting pieces of the company's geo-risk research division. In addition to being one of the world's most comprehensive natural catastrophe datasets, NatCatSERVICE provides a one-stop platform from which users can access, analyze, and understand natural disasters at many different temporal and spatial scales.

NatCatSERVICE Data and Methods

The current NatCatSERVICE database contains around 28,000 individual event datasets and boasts a complete accounting of worldwide disasters since 1980. These data enable users to perform detailed trend analysis at global, continent, and county levels. Although subcountry details, analysis, and reporting are not available as part of NatCatSERVICE, the database does provide the most comprehensive basis for long-term trend analysis for "great natural catastrophes" since 1950. The database records nearly 1,000 loss events per year and catalogs each into one of six main loss categorizes, from "small-scale" events with little or no reported property damage and fewer than 10 fatalities to "great natural catastrophes" that exceed a region's ability to help itself, require international assistance, or result in thousands of fatalities and/or hundreds of thousands of homeless. Additional levels of classification within the database further define events by grouping them by one of four main causal agents: geophysical, meteorological, hydrological, and climatological. These categories conform to international standards created through a 2007 collaboration among the Asian Disaster Reduction Center, the Center for Research on the Epidemiology of Disasters (CRED), the International Strategy for Disaster Reduction (ISDR), Munich Re, Swiss Re, and the United Nations Development Programme (UNDP), which effectively harmonized the hierarchy and terminology of natural hazards classification across governments, nongovernmental organizations (NGOs), and private-sector entities. Further subdivision of these main categories provides a standard basis from which international disaster impact assessment, analysis, and comparisons can be conducted.

Outreach and Publications

NatCatSERVICE is often cited as a source for publications across a broad spectrum of outlets, and Munich Re has established a long tradition of publication in both scientific and proletarian channels. Topical areas for publications from Munich Re include articles, newsletters, presentations, and analytical map products related to climate change, marine insurance, natural hazards, sustainability, property and casualty, Solvency II, and workers' compensation. In addition, Munich Re publishes a variety of annual special-topic editions, including global-, Asia- and U.S.-focused natural catastrophe reports aimed at shedding light on the broadsuite disaster impacts for specific places, including economic, social, and geospatial impacts.

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See Also: Damage Assessment; Insurance; Losses, Quantitative Versus Qualitative; Reinsurance; Risk Assessment.

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National Fire Protection Association (NFPA) 1600, 2007, and 2010

The National Fire Protection Association *Standard on Disaster/Emergency Management and Business Continuity Programs, 2010 Edition* (NFPA 1600) is recognized by the Department of Homeland Security under Public Law 110-53. This document is designated and certified by the Department of Homeland Security as antiterrorism technology under the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act). The standard identifies components and provides details for inclusion in an all-hazard disaster/emergency management or business continuity program applicable to local, regional, national, and international private, public, not-for-profit, nongovernmental, and tribal entities.

NFPA 1600 is the National Fire Protection Association *Standard on Disaster/Emergency Management and Business Continuity Programs, 2010 Edition*. It was published in earlier editions in 2000, 2004, and 2007, but the first edition to fully encompass business continuity as a separate component is the 2010 edition. It has been reviewed and amended triannually by the NFPA Technical Committee on Emergency Management and Business Continuity. The standard is a "consensus standard" developed by a technical committee of practitioners and experts, including representatives and support from the International Association of Emergency Managers (IAEM), the Association of Contingency Planners (ACP), and Disaster Recovery Institute International (DRII).

NFPA 1600 is a very clear list of essential components for an emergency plan. It is suitable for communities, businesses, universities, and not-for-profit organizations and, in fact, has been used as a model by many such entities. It was accepted by the Department of Homeland Security as one of three standards for the voluntary private-sector preparedness planning outlined in Public Law 110-53. Though its initial acceptance and use was by public organizations and jurisdictions, its applicability to private-sector organizations was recognized by users such as emergency management directors, corporate risk management personnel, university professors, authors, trainers, and practitioners. By 2004, the standard was incorporated into training programs at police and fire academies, disaster recovery and emergency management conferences, community and private sector–based training, and professors and authors of undergraduate and graduate courses in emergency management degree programs.

The standard includes a chapter-by-chapter list of the essential components of an all-hazards disaster/emergency management and business continuity program. Its stated purpose is to provide the fundamental criteria to develop, implement, assess, and maintain the program for prevention, mitigation, preparedness, response, continuity, and recovery. It applies to all levels or jurisdictions, local, national, or international.

The NFPA 1600 standard contains a brief definition of terms to guide the end user through the document. It defines not only emergency management and business continuity terms but also the language of the standard, such as "approved," "shall," "should," and "vital records." For a more complete glossary, see http://www.drj.com/tools/tools/glossary-2.html for business

At Francis S. Gabreski Air National Guard Base in New York, firefighters with the New York Air National Guard's 106th Civil Engineering Squadron train with local firefighters to remove victims from a mock burning aircraft, August 15, 2012. The National Fire Protection Association 1600 standard is incorporated into training programs at police and fire academies, emergency management conferences, and public and private sector–based agencies.

continuity terms defined by the Glossary Committee of *Disaster Recovery Journal* and http://training.fema.gov/EMIWeb/edu/termdef.asp for terms defined by the Federal Emergency Management Agency (FEMA).

There are five chapters (4–8) that detail the criteria, each with specific subsections that together outline a complete all-hazard disaster/emergency management or business continuity program.

Chapters and Subchapters

Chapter 4, "Program Management," presents the essential elements in establishing a disaster/emergency management and business continuity program. It includes subsections on Leadership and Commitment, Program Coordination, Program Committee, Program Administration, Laws and Authorities, Performance Objectives, Finance and Administration, and Records Management.

Chapter 5, "Planning," outlines the sections to be included in the program. It is not a template for a plan but a recommended set of criteria. It includes subsections on Planning Process, Common Plan Requirements, Planning and Design, Risk Assessment, Business Impact Analysis, Prevention, and Mitigation.

Chapter 6, "Implementation," is concerned with matters once an incident has occurred. It includes Resource Management, Mutual Aid/Assistance, Communications and Warning, Operational Procedures, Emergency Response, Employee Assistance and Support, Business Continuity and Recovery, Crisis Communications and Public Information, Incident Management, Emergency Operations Centers (EOCs), and Training and Education. All of these subsections should be developed in a program in advance of an incident, even though they pertain to response and recovery.

Chapter 7, "Testing and Exercising," addresses the need to practice using the program and to plan in order for personnel to be well acquainted with their responsibilities. It includes Entity Evaluation, Exercise Evaluation, Methodology, Frequency, and Exercise Design. (See also http://www.fema.gov/pdf/media/factsheets/2010/npd_hseep.pdf for the Homeland Security Exercise and Evaluation Program Toolkit.)

Chapter 8, "Program Improvement," offers criteria for assessing and improving a plan or program, which is an ongoing process. It includes the subsections Program Reviews and Corrective Action.

Though each chapter and subsection briefly define and describes the criteria, a follow-up "Annex A, Explanatory Material" is numbered to correspond with the subsections in all eight chapters. For example, "Annex A.3.3.4" explains the concept of continuity. "Annex A.3.3.13" describes the components of an Incident Management System similar to the NIMS ICS (National Incident Management System, Incident Command System). "Annex 4.6.1" explains why it is important to have performance objectives. Critical to life safety of responders is "Annex 5.2.7," which provides details of hazard control, an issue of safety and health to all personnel participating in an emergency or disaster.

In addition to the standard criteria and the Annex, NFPA 1600, 2010 edition, contains a crosswalk to two other documents—the "DRII Professional Practices for Business Continuity Practitioners, 2008" and the Canadian Standards Association's "CSA Z1600-08, Emergency Management and Business Continuity Programs." NFPA 1600 has been the standard for a number of "maturity models" that have been constructed by both private-sector and not-for-profit organizations dedicated to business continuity planning.

Finally, NFPA 1600 includes "Annex B Program Development Resources," "Annex C Self Assessment for Conformity With NFPA 1600, 2010 Edition," "Annex D Management System Guidelines," and "Annex E Informational References." These annexes, B–E, are brief but valuable for extending the use of the standard.

NFPA 1600 has been used and reviewed globally by practitioners who desire to create the most complete disaster/emergency management and business continuity programs. There are other standards, and this standard has met the requirements and approval of countless organizations in search of risk management, emergency mitigation, preparedness, response, and recovery solutions. The clear and concise format has provided ample opportunity for partnerships to be developed between public and private entities whose focus is on efficient, effective, well-documented planning and implementation for the protection of lives, property, and the environment.

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See Also: All-Hazards; Business Continuity Planning; Disaster Recovery; Emergency Management, Principles of; Exercises; Incident Action Plans; Incident Response; Pre-Crisis Training and Planning; Preparedness; Response; Strategic Plans; Training.

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National Incident Management System (NIMS)

The National Incident Management System, also known as NIMS, is a system of common procedures, structures, and training designed to promote more cooperative and integrated domestic incident and emergency preparedness, management, and response. It emerged in the U.S. government from Homeland Security Presidential

Directive 5 (HSPD-5 or Management of Domestic Incidents) called for by president George W. Bush on February 28, 2003, following the terrorist attacks of September 11, 2001. The release of NIMS was announced by Department of Homeland Security (DHS) Secretary Tom Ridge on March 1, 2004. Following what was seen by some as flawed disaster response despite the use of NIMS during natural disasters such as Hurricane Katrina in 2005, NIMS was updated after a discussion that began in 2006 and ended with new publications and guidelines in 2008. This update was designed to clarify the role of NIMS and other agencies and systems in disaster mitigation, preparedness, response, and recovery.

The Federal Emergency Management Agency (FEMA) and DHS describe NIMS as a template that was designed to provide consistency and cooperation in incident mitigation, prevention, response, and recovery across various levels of government (including local, tribal, state, and federal), nongovernmental organizations (NGOs), and various other organizations. NIMS was developed from already existing systems such as the incident command system (ICS) but was designed to go beyond that, creating an integrated national system. It allows crisis managers to work within a shared system, making cooperative efforts easier. Federal departments and agencies, as well as different state and local departments and agencies and nongovernmental organizations, are required to incorporate NIMS into preparedness and response plans such as their emergency operations plans (EOPs) or comprehensive emergency management plans (CEMPs) in order to be able to qualify for federal emergency preparedness funding.

Although not all private organizations are legally required to work with NIMS, it is important for them to know that government agencies and other organizations are using it, and an understanding of or training in NIMS will likely be useful if they need to interact with these groups. Even if these crisis managers do not use NIMS within their own organizations, they will almost inevitably work with other organizations or government agencies that do. Because of its widespread use, it is important that crisis managers at least be familiar with NIMS. Such familiarity is important to avoid confusion. For example, crisis managers should know that NIMS encourages the use of "plain English" to avoid confusion around jargon. Crisis managers will also likely find NIMS training useful. NIMS training is offered through the National Integration Center (NIC, formerly known as the NIMS Integration Center), as well as through FEMA's Emergency Management Institute (EMI) and the U.S. Fire Administration (USFA).

Five Key Components

NIMS is made up of five key components: preparedness, communications, and information management; resources management; command and management; supporting technologies; and ongoing management and maintenance. These components are each important to crisis management, as they establish a variety of critical functions within a broader system of cooperation and coordination among a variety of private groups and government agencies, allowing for well-organized management of disaster response. Each of these five components is designed to work with the others within the system as a whole, and to be fully utilized, they must work in tandem.

Preparedness comprises assessment, planning, and training for future potential crises for individual personnel and organizations as a whole, giving crisis managers information about which steps have been taken to prepare for domestic incidents, emergencies, or disasters. Communications and information management are based on a series of requirements that there be standardization across different communications systems, rendering them interoperable, reliable, and redundant, enabling crisis managers to share information effectively, clearly, and concisely. Resources management includes the organization, mobilization, and tracking of resources needed for disaster response, enabling crisis managers to work together to mobilize and share necessary resources. Command and management are based on three distinct systems of organization: Incident Command System (ICS), multiagency coordination systems, and public information. These organizational systems ensure that crisis managers, other responders, and, in some cases, the public are working together to respond to crises within the same parameters. Finally, ongoing management and maintenance includes systems like those in the National Integration Center (NIC) and supporting technologies. Supporting technologies enable crisis managers to communicate with other responders and manage resources more effectively, and systems like the NIC allow for a shared management center, further promoting the cooperative use of information and resources.

NIMS lays the foundation for scalable approaches to preparedness, interoperability, resource management, and coordination. Although NIMS is designed to encourage consistency between different agencies and organizations, it is not a specific response, management, or communications plan. It is designed to be alterable as needed, based on the crisis or circumstances. NIMS is designed so that agencies and organizations at different levels can adapt its guidelines to different situations as needed. With the establishment of NIMS, the National Response Framework (NRF; formerly known as the National Response Plan, or NRP) was put into place as a guide for all-hazards response in the United States. Although NIMS is a general system designed to focus on establishing best practices and training and guidelines to put them in place, the NRF focuses on important structures and key goals for participants.

NIMS reinforces a shared system with common training, structures, and processes that allows crisis managers from different agencies and organizations to work together in a unified approach. NIMS and the NRF are designed to support cooperation between different groups involved in emergency, disaster, and crisis response. This focus on cooperation is important, but it is important to note that the system also maintains some preexisting standards of disaster response and emphasizes the fact that control in crisis response remains first and foremost at the local level. Even when NIMS is not in use, the guidelines for cooperation and interoperability it emphasizes can be used by emergency responders and crisis managers, enabling them to communicate clearly and quickly, share resources, and approach problems with a unified and cooperative front. Moreover, this cooperation both inside and outside NIMS occurs while agency and organization independence and goals are maintained.

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See Also: Department of Homeland Security (DHS); Federal Emergency Management Agency (FEMA); Interoperability; National Response Framework; Policy Setting.

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National Oceanic and Atmospheric Administration (NOAA)

Established in 1970 by uniting three of the oldest federal agencies in the United States under the auspices of the Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA) is dedicated to better comprehending the physical environment in order to assist decision makers. During the 1970s, there was a heightened sense of environmental awareness in the United States as citizens realized that the economy and ecology are inextricably linked. The government recognized the need to protect people and property from natural disasters, such as hurricanes and floods, as well as from hazards created by humans, such as air pollution and groundwater contamination. This realization led to the passage of numerous environmental laws and the establishment of NOAA, with a primary mission to forecast changes in the environment that can negatively impact the public. Thus, NOAA plays an enormous and essential role in crisis management from the outer reaches of the atmosphere to the deepest depths of the oceans. Fundamental goals espoused by NOAA are critical elements in managing crises at every level of the physical environment. These objectives include providing real-time weather information, conducting climate research, and ensuring the sustainability of coastal and marine resources. To accomplish these aims, NOAA has the support of several scientific agencies under its jurisdiction.

Satellite, Data, and Information Service

The data gathered by NOAA from land- and ocean-based weather stations as well as space-based satellites are the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS). The primary purpose of NESDIS is the promotion and protection of the economy and the environment by providing data on a global scale from satellites and other sources. This Earth system monitoring is accomplished through the collection of atmospheric and climatic information as well as oceanographic and geophysical data, which are available for analysis by scientists around the world. Much of this research is focused on climate change, as NOAA's diverse satellite platforms provide tangible evidence of higher land and sea surface temperatures, elevated greenhouse gas concentrations, melting ice caps and glaciers, rising sea levels, increased deforestation, and expanding desertification. Each of these negative impacts represents a potential crisis for administrators and political leaders at every level.

Oceanic and Atmospheric Research

NOAA has its own research agency that analyzes data, writes technical reports, and develops environmental products. In addition to investigating climate change, the Office of Oceanic and Atmospheric Research (OAR) is committed to a better understanding of all types of natural and anthropogenic phenomena that could result in a crisis situation. These include holes in the ozone layer, solar flares, air and water pollution, and El Niño/La Niña events. The OAR supports thousands of engineers, technicians, and scientists through research centers, laboratories, and programs, all dedicated to protection and preservation.

National Ocean Service

The responsibility for preserving and enhancing coastal areas and oceans belongs to the National Ocean Service (NOS). The primary purpose of the NOS is to manage environmental, economic, and social pressures along the coasts and in the oceans to ensure that they are healthy, safe, and productive. The NOS monitors dangers to human health such as algal blooms, toxins, hypoxia, and waterborne illnesses and is concerned with every stage of chemical and oil spills, from response and assessment to cleanup operations. The NOS also deals with natural hazards such as tsunamis through the use of its network of tsunami warning systems. Once local officials receive a tsunami watch or warning, they have the option to activate the Emergency Alert System, which sends a broadcast to evacuate beaches and low-lying coastlines to media outlets and NOAA weather radios. These broadcasts are vital to handling a potential tsunami emergency. Without adequate warning, the death toll can be staggering, as was the case in 2004 along the coastline of Indonesia when more than 200,000 people died as a result of a 9.1 magnitude earthquake and the accompanying tsunami. As the planet continues to warm, the NOS is developing products to reduce the ramifications of climate change on coastal communities, including sea level rise, storm surge, and beach erosion.

National Weather Service

Perhaps the most notable of the NOAA agencies is the National Weather Service (NWS), which has 122 weather forecast offices that are constantly gathering and analyzing data from thousands of weather stations and satellites. The charge of the NWS is to protect property, people, and the economy by providing short-term weather forecasts and warnings, long-range climate predictions, and relevant hydrologic information for the United States and its territories. Natural disasters such as hurricanes, tornadoes, floods, droughts, and wildfires are among the crises that are more manageable through the work of the NWS. Once the forecasts are made, contingency plans can be put into place to mitigate the impending damage. With enough warning prior to hurricane landfall from the National Hurricane Center, which is part of the NWS, much of the population can evacuate, those who cannot leave can be transported to safer facilities or prepare to ride out the storm, and organizations such as the National Guard and the Red Cross can plan for the disaster and prevent the escalation of the crisis in the aftermath of destruction. In the case of tornadoes, the Storm Prediction Center, also an arm of the NWS, has the ability to issue high-risk warnings as much as 24 hours in advance and refers to storms as catastrophic and life-threatening in an attempt to become more proactive in communicating the severity of these deadly natural disasters.

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See Also: Earthquakes; Evacuation; Fires; Floods; Global Warming; Heat Waves; Hurricanes, Typhoons, and Cyclones; Tornadoes and Severe Thunderstorms; Tsunamis.

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National Preparedness Goal

The National Preparedness Goal was established in Presidential Policy Directive 8: National Preparedness, in 2011, to prepare the nation for those threats that pose the greatest risk to the United States. It is an all-hazard, risk-based, all-of-nation approach. The National Preparedness Goal is this: “A secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.”

History

In 2003, the president of the United States issued Homeland Security Presidential Directive 8 to direct the Secretary of Homeland Security to develop an all-hazard national preparedness goal. The outcome of that was the National Preparedness Guidelines (NPG). There are four components to the National Preparedness Guidelines:

1. The National Preparedness Vision, which defines the goal
2. The National Planning Scenarios, which explore 15 major scenarios to help guide planning efforts
3. The Universal Task List (UTL), which is a list of approximately 1,600 tasks involved in emergency response
4. The Target Capabilities List (TCL), which defines 37 capabilities that all responding organizations should possess

The National Preparedness Guidelines provide concrete information to guide responding organizations and agencies at all levels of government in their all-hazards preparedness efforts. The Universal Task List and Target Capabilities List, in particular, can be used to measure preparedness and help guide the development of plans, training, and exercises.

In 2011, the president of the United States issued Presidential Policy Directive 8 (PPD-8): National Preparedness. PPD-8 further develops the concept of the national preparedness goal and calls for a mechanism for tracking preparedness. In 2011, the National Preparedness Goal document was released. Much like the National

Preparedness Guidelines, the National Preparedness Goal is capability based. The National Preparedness Goal also calls for risk-based planning as well as whole community preparedness.

Risk-Based Planning

The understanding of risk is central to the National Preparedness Goal. As directed in Presidential Policy Directive 8: National Preparedness, a Strategic National Risk Assessment was conducted. The types of hazards and threats facing the nation were found to be wide-ranging. This conclusion served to support the need for all-hazards, capabilities-based planning. Key risks identified include natural hazards, varying in type and potential severity across the country; pandemic influenza and emerging infectious diseases; technological and accidental hazards, with aging infrastructure posing a special risk; terrorist use of weapons of mass destruction; and cyber attacks, especially those targeted at utility infrastructure and financial institutions.

Shared Responsibility for Preparedness

The National Preparedness Goal identifies preparedness as a shared responsibility. There is a specific focus on all-of-nation or whole community. This means that responsibility is shared by individuals and organizations, the public sector and the private sector, and nonprofit and faith-based organizations. Part of the goal is to enable all members of the community to contribute to preparedness effort, including children, people with disabilities, and people with limited English-language proficiency. Preparedness is not limited to specific individuals, organizations, or the government.

Core Capabilities and Mission Areas

There are five mission areas, each with associated core capabilities. The core capabilities evolved out of the Target Capabilities List established under the National Preparedness Guidelines. The mission areas are prevention, protection, mitigation, response, and recovery. The core capabilities are

A Coast Guard vessel from Sector Upper Mississippi River patrols a safety zone around the I-35W bridge collapse site in downtown Minneapolis, Minnesota, on August 3, 2007. On August 1, at 6:05 P.M., a nearly 2,000-foot section of the concrete and steel bridge, under the weight of construction materials and about 100 cars, buckled and fell into the Mississippi River. Aging infrastructure is thought to pose a special risk in the Strategic National Risk Assessment for the National Preparedness Goal.

used to achieve the National Preparedness Goal. Each of these core capabilities includes capability targets that can be measured. The capabilities and targets are reflective of the communal effort and are not specific to an entity or level of government.

The core capabilities by mission area are as follows. Note that Planning, Public Information and Warning, and Operational Coordination are common to all five areas because they are critical in all five areas.

1. *Prevention* refers to avoiding or stopping an act of terrorism (actual or threatened). The core capabilities for prevention are Planning; Public Information and Warning; Operational Coordination; Forensics and Attribution; Intelligence and Information Sharing; Interdiction and Disruption; and Screening, Search, and Detection.
2. *Protection* refers to protecting people and material assets against threats and hazards. Core capabilities under protection are Planning; Public Information and Warning; Operational Coordination; Access Control and Identity Verification; Cybersecurity; Intelligence and Information Sharing; Interdiction and Disruption; Physical Protective Measures; Risk Management for Protection Programs and Activities; Screening, Search, and Detection; and Supply Chain Integrity and Security.
3. *Mitigation* focuses on lessening the impact of disasters, thereby minimizing loss of life and property. Mitigation core capabilities are Planning; Public Information and Warning; Operational Coordination; Community Resilience; Long-term Vulnerability Reduction; Risk and Disaster Resilience Assessment; and Threats and Hazard Identification.
4. *Response* refers to the actions following an incident. Goals are to save lives and protect property and the environment. The core capabilities for response are Planning; Public Information and Warning; Operational Coordination; Critical Transportation; Environmental Response/Health and Safety; Fatality Management Services; Infrastructure Systems; Mass Care Services; Mass Search and Rescue Operations; On-scene Security and Protection; Operational Communications; Public and Private Services and Resources; Public Health and Medical Services; and Situational Assessment.
5. *Recovery* addresses the actions that focus on the restoration, strengthening, and revitalization of communities. This includes the economy, infrastructure, and housing, in addition to the health and well-being of a community from a social cultural perspective. Core capabilities under recovery are Planning; Public Information and Warning; Operational Coordination; Economic Recovery; Health and Social Services; Housing; Infrastructure Systems; and Natural and Cultural Resources.

Maintenance

The National Preparedness Goal is reviewed on a periodic basis, with updates made by a core committee; revisions are made available for public review and comment. It is considered to be a living document based on re-evaluation of threats and hazards as well as changes in needs and capabilities.

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See Also: All-Hazards; Department of Homeland Security (DHS); Federal Emergency Management Agency (FEMA).

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National Response Framework

The National Response Framework (NRF) guides response to all-hazards incidents and is focused on domestic incident response. It is a companion document to the National Incident Management System (NIMS), with its flexible, scalable, and adaptable coordinating structures.

The framework is only one element of the broader National Strategy for Homeland Security. Other elements focus on prevention and protection, while the framework focuses on response and recovery. Key elements of the National Response Framework include the aligning of roles and responsibilities across jurisdictions and the linking of federal, state, local, and tribal governments with the private sector and nongovernmental organizations. The result is a unified approach to emergency management. Unlike disaster declarations, the National Response Framework is always in effect and can be fully or partially implemented depending on the needs of the incident response.

There is no need for a formal declaration or federal coordination. The National Response Framework was written for emergency managers as well as for senior elected and appointed officials. The National Response Framework establishes a response doctrine and frames planning as an essential component of response. The National Response Framework comprises the core document, the Emergency Support Function (ESF) Annexes, Support Annexes, Incident Annexes, and Partner Guides.

History

In 2003, U.S. President George W. Bush issued Homeland Security Presidential Directive 5: Management of Domestic Incidents (HSPD-5) to enhance the management of domestic incidents through creation of a comprehensive national incident management system. This newly established system covered all phases of emergency management (mitigation, preparedness, response, and recovery) and all levels of government (federal, state, local, and tribal). The scope applied to natural disasters, terrorist attacks, and other major emergencies. The goal was to establish a system that would allow a unified, interoperable approach to emergency management. The ultimate result of HSPD-5 is the National Incident Management System and the National Response Plan (NRP).

In 2008, the National Response Plan evolved into the National Response Framework. The National Response Plan replaced the Federal Response Plan (FRP) that had been established in 1992. The National Response Plan itself was groundbreaking for including all levels of government. The change in title from the National Response Plan to the National Response Framework reflected that the document is intended not as an operational plan but rather as an outline of how varying responding agencies (public and private) will work together to manage emergencies. The change in content was largely driven by input from key stakeholders. Whereas the National Incident Management System provides a template for emergencies response, the National Response Framework describes roles and responsibilities, specific authorities, and best practices for the management of all domestic emergencies.

In 2012, the National Response Framework was open for review and comment as a means of continuous improvement.

National Response Framework Structure

There are five main components to the National Response Framework. The core document is the central framework upon which all the annexes and guides are based. It describes roles and responsibilities, response actions, and planning considerations. The Emergency Support Function Annexes group capabilities by function to facilitate a more coordinated response. The Support Annexes focus on response functions that may be found in any emergency response regardless of the nature of the hazard.

Incident Annexes focus on responses to specific types of hazards. Partner Guides identify roles and responsibilities for different levels of government and the private sector. Together, these elements combine to provide an overarching framework that delineates responsibilities, defines the mechanisms for working together, and links all levels of government as well as the private sector.

National Response Framework Components

The core document comprises five major chapters. Chapter 1 describes roles and responsibilities and addresses who is involved in emergency management activities at the local, tribal, state, and federal levels as well as in the private sector and nongovernmental organizations. Chapter 2 describes response actions and covers what is done to manage incidents. Chapter 3 describes response organization and addresses how the nation is organized to respond to emergencies. Chapter 4 addresses planning as a critical element of effective response. The importance of planning is addressed and a summary of national planning elements is included. Chapter 5 discusses additional resources such as an outline for the online National Response Framework Resource Center managed by the Department of Homeland Security.

The Emergency Support Function (ESF) Annexes are a way of grouping federal resources and capabilities into functional areas that are most frequently needed in a national response. The Emergency Support Function model is also used at the state and local levels in some jurisdictions. There are 15 Emergency Support Functions:

1. Transportation
2. Communications
3. Public Works and Engineering
4. Firefighting
5. Emergency Management
6. Mass Care, Emergency Assistance, Housing, and Human Services
7. Logistics Management and Resource Support
8. Public Health and Medical Services
9. Search and Rescue
10. Oil and Hazardous Materials Response
11. Agriculture and Natural Resources
12. Energy
13. Public Safety and Security
14. Long-Term Community Recovery
15. ESF #15 External Affairs

Support annexes describe response elements that are common to many incidents, regardless of the nature of the emergency: critical infrastructure and key resources, financial management, international coordination, private-sector coordination, public affairs, tribal relations, volunteer and donations management, and worker safety and health.

The incident annexes explore the unique elements of response to seven broad categories of incidents: biological incident, catastrophic incident, cyber incident, food and agriculture incident, mass evacuation incident, nuclear/radiological incident, and terrorism incident law enforcement and investigation.

The partner guides provide descriptions of key roles, responsibilities, and actions for local, tribal, state, federal, and private-sector response partners.

Scope and Response Doctrine Key Principles

The framework applies to all types of domestic incidents, regardless of cause or jurisdiction. It allows for incident response to be scaled up or down as needed.

The response doctrine describes the operational concepts behind the framework. There are five key principles to the response doctrine: engaged partnership; tiered response; scalable, flexible, and adaptable operational capabilities; unity of effort through unified command; and readiness to act.

1. *Engaged partnership* refers to collaboration of leaders at levels, whether public or private sector. The collaboration includes development of the shared goals in response and alignment of capabilities. One aim of this type of collaboration is to share the burden during response and to prevent any one element from becoming overwhelmed.
2. *Tiered response* describes the concept that incidents are managed at the lowest jurisdictional level possible. This allows for more efficient management. Additional capabilities may be added as needed to support the response. All emergencies begin and end at the local level, and most incidents are wholly managed at the local level. Some will require additional support from neighboring jurisdictions and/or the state. A still smaller number will require federal support. Tiered Response describes how

response can be scaled both up and down as the needs of the incident require.

3. *Scalable, flexible, and adaptable operational capabilities* refers to the concept that plans and structures are designed in a way to manage incidents varying in scope, size, and complexity.
4. *Unity of effort through unified command* refers to the Incident Command System concept that integrates each organization's chain of command across jurisdictions in support of common objectives. Incidents should be manageable across jurisdictional boundaries with interoperable functionality.
5. *Readiness to act* describes the concept that preparedness and response is a collective responsibility across all levels of government and across communities. It is required under the principles of the Incident Command System, with a focus on clear communication and coordination.

Maintenance

The National Response Framework is reviewed on a periodic basis, with updates made by a core committee and revisions made available for public review and comment. In 2012, the National Response Framework was opened for public comment.

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See Also: All-Hazards; Department of Homeland Security (DHS); Emergency Support Functions; Federal Emergency Management Agency (FEMA); Incident Response; National Incident Management System (NIMS).

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Network for Good

Network for Good is a nonprofit organization formed in 2001 to provide a comprehensive Internet philanthropy portal. The portal aids nonprofits and others raising money over the Internet and processes gifts through its Internet presence, keeping a percentage as a processing fee. Resources and guidance are offered to organizations seeking to improve their online presence and donor relations. The Web site also provides a database for those looking for volunteer opportunities. The organization seeks to help users take advantage of the social networking wave sweeping our culture by using these networks to raise money for charity.

Network for Good was founded in 2001 by AOL, Yahoo!, and Cisco Systems and has its headquarters in Bethesda, Maryland. AOL's helping .org, a philanthropic portal, was the starter for the Network for Good Web site. It has become the most prominent online giving portal. Initially, 100 percent of credit card online donations to charities channeled by Network for Good went directly to the charities. The portal itself paid the transaction costs. This has since changed, and a percentage of donations is withheld by Network for Good. Ease of online giving is one of the benefits cited by donors as a main reason for donating through an entity like Network for Good.

Bill Strathmann is the CEO of Network for Good. He worked in mergers and acquisitions prior to his work with Network for Good. He was also a consultant to corporations and nonprofit organizations in the areas of strategy planning and business improvement.

Network for Good provides a fund-raising service titled DonateNow to nonprofits and others wanting to raise charitable gifts. The organization sets up a donation page, processes the contributions, and sends gift receipts to the contributors.

There is a one-time setup fee, a monthly fee, and 3 percent of contributions is withheld for transaction fees. When Network for Good is the portal donors use to give to a charity, the gift is actually made to Network for Good's donor-advised fund. That fund then transfers to money to the designated nonprofit.

Network for Good has enabled many small and medium-sized charities to enter the world of online giving though its training and Web giving support functions. It also helps enable social networks to be used to raise money for causes. Individuals are empowered through these sites to raise money for causes among their friends and social networks. It provides individuals an opportunity to host a charity badge on their Web sites, blogs, or social networks. A charity badge is a tool an individual can use to provide information on a charity, track giving, and provide an opportunity for those who see the badge to contribute.

Network for Good actively pursues partnerships with corporations. It provides corporations the technical support and giving coaching so that they can enable their employees to give to charities supported by the business or by employees.

In 2011, 15 percent of giving via the Network for Good was through social networks. This kind of giving is up dramatically. In 2011, excluding disaster relief donations, giving through Network for Good rose 17 percent over the previous year. The Web site provides the opportunity to give to any of the 1.8 million charities listed by Network for Good.

Network for Good has responded in special ways after a number of disasters. After the tsunami of December of 2004, it set up a Web page devoted to that event with links to organizations involved in the relief effort and with an opportunity to donate online. It has created similar pages after many other disasters. In a study in which Network for Good participated, it was determined that online giving was becoming the preferred method of giving by donors seeking to give to disaster relief efforts.

The Web site provides a prospective donor the resources to research and give to almost any charity. Network for Good stores an individual's donation history for tax purposes. It also provides users a place to save lists of favorite charities. The site provides a database of volunteer opportunities for individuals looking to volunteer their time. Reference material related to the nonprofit world, especially as it relates to presence on the Web, is also offered. The organization provides the Good Card, a gift card that can be purchased and given. The recipient can use the card to give a charitable gift to one of many possible charities. The Network for Good also provides a number of other premium services to nonprofits, including e-mail marketing, donor management, events management, and premium training.

In 2008 Network for Good acquired ePhilanthropy. ePhilanthropy was a nonprofit educational organization that promoted ethical practices among nonprofits. It also provided training in a number of different formats to equip nonprofits to be more efficient in their work. It has worked to pass on best practices to nonprofits in the area of the Internet, nonprofits' practices, and online giving. Network for Good sought to increase its presence by offering training and resources to nonprofit organizations.

In 2011, $138 million was donated through the Network for Good platform from 1.6 million donations. These funds were distributed to more than 40,000 charities. This organization has earned an excellent reputation and is seen as a trustworthy partner by many.

Network for Good created the Digital Giving Index as a means of conveying to interested parties the trends observed in the field of nonprofit support and online giving. The data came from an examination of the giving it processed. Among the reported trends was that giving through peer-to-peer opportunities using social networks was becoming a mainstream way of giving. The Index is updated quarterly.

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See Also: Crisis Communications; Electronic Media; Nongovernmental Organizations; Social Media; Volunteer Coordination.

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News Media

Information is one of the most vital commodities in disaster. During emergencies, it will be in short supply at the very moment when demand is greatest. Television, radio, and newspapers will be primary sources of information for survivors, the public, and, to a certain extent, the suppliers of national and international aid. In turn, the aid agencies will also be influenced by the opinions and solidarity of the general public, which tend to be sensitive to the quality of news received. Moreover, disaster managers cannot afford to ignore the media, as they may have a determining influence on the behavior and activities of the general public. But although the news media can motivate the public to contribute to relief appeals, they can to a certain extent turn disaster relief on and off like a tap by arbitrarily highlighting, minimizing, or ignoring the plight of survivors. Media culture reflects the dominant political and social institutions that created it, and that it helped create. This is a form of synergy that has both positive and negative connotations. In a democracy, the mass media can be induced to fulfill a public service role in disaster, but they are not organs of government, and it may be equally important that they play the role of independent evaluator, of government actions.

The media and the manner in which journalists work have a role in major emergencies, both negative and positive: the perpetuation of misassumptions is balanced by the media's public service role. There are emerging trends in the reporting of emergencies, disasters, and crises that are largely driven by the momentous changes wrought by information technology, including Web-based news services and the "citizen journalism" promoted by social media.

News Reporting in Disaster

News is a perishable commodity whose value changes daily. It provides a frame of reference through which events are judged, debated, and assimilated. Given the role of the media as both a creation of society and an influence upon it, news both records and influences the prevailing social reality. This is especially true in crisis situations, but the severity of a disaster does not determine its news value, which is a function of various factors, namely:

- *Location:* whether the place where the disaster occurs is of strategic importance to the readership or the country involved
- *Distance*: whether the geographical area involved is well known or of central importance to the audience of the news
- *Hazard agent:* some causes of disaster are more dreaded than others, and some are more spectacular
- *Difficulty of covering the event:* reports on disasters in distant places may not be extensive, detailed, or sustained; neither will reports from places where there is overt censorship
- *Perceived audience interest:* the degree of personal involvement or connection between the audience and the event
- *Context:* the context of what else is news at the time

In regard to audience interest, the earthquake and tsunami in the Indian Ocean basin on December 26, 2004, elicited massive interest from the publics of European and North American countries, perhaps because it involved a significant number of Western tourists. Massive publicity had a graphic content and a strong sense of immediacy, to which people felt they could relate. As a result, donations given to the tsunami relief appeals were higher than ever before, reaching almost $4.5 billion. At the same time, a severe crisis in Darfur led to a United Nations–supported relief appeal that failed to reach the target donation figure of $30 million, not least because media coverage was extremely slight. Concerning the context of other events, researchers have shown that disaster news can be scaled down if it is overshadowed by contemporary events of other kinds. For example, in 1988 a storm caused 24 casualties and toppled 15 million trees in southern England, but the news coverage was abated by stock market turmoil and local elections that occurred at the same time as the storm.

In general, the importance of a news story is determined by several factors. Impact on the nation and national interest is one; number of people involved is another. The involvement of high-ranking politicians, officials, or celebrities can increase the news value of a story. So can any significant connection between the event and a country's past history or future aspirations.

In a disaster, news media reporting rarely reflects the objective balance of facts relating to the event. There is usually a heavy emphasis on human interest stories, which chronicle "how ordinary people are coping" and in so doing make the disaster comprehensible to readers, listeners, or viewers. The news value of a disaster is increased by adding role-reversal stories, exposés, anecdotes, and tales of heroism, whether real or invented. News value is also affected by the "freshness" or "staleness" of the story, the need to avoid repetition, and the balance of subject, location, politics, pace, action, clarity, and aesthetics. As one might surmise, the news is manufactured as much as it is reported, as manifest in the slant put upon facts and information and in the selectivity with which they are reported.

Anatomy of the Media in Disaster

News after disaster comes from four main sources: reporters sent into the field, journalists based at the nearest center of government, press agency syndicated news-feeds, and the communiques (press releases) of official agencies. With the diffusion of social media, citizen journalism has become important. Television remains the principal source of information for most people. It has a greater sense of immediacy than the other news media, except perhaps Internet-based ones, with which it has great potential for synergy. Radio is capable of offering greater depth, but it has a higher dependency on interviews. Newspapers and magazines can offer more information, including more detailed graphics and statistics.

One could argue that the first "modern disaster" was the famine that occurred (through artificial causes of denial of food) in the Nigerian state of Biafra in 1967–70. This was the first event in which starvation was chronicled in the field and films of it were played to Western audiences on evening television news bulletins a matter of hours later. It was thus the first disaster to have a strong sense of immediacy—almost in "real time"—to the televised reporting.

A FEMA public information officer (center) is interviewed about Hurricane Lee by WFMZ-TV, Allentown, Pennsylvania, October 7, 2011. The credibility of authorities who are responsible for disaster relief can be impacted by reports in the media.

Subsequently, as the scope and power of television journalism increased, researchers identified four styles in the reporting on disasters:

- Populist/sensationalist accounts that "threaten viewers with the awful"
- Elitist/factual accounts that "render the awful manageable"
- Ignorant/didactic accounts that "demystify the awesome"
- Pluralist/feature accounts that "blend sagacity with resignation"

Furthermore, with the advent of 24-hour news coverage, television news has developed a repetitiveness and an appetite for novelty that is even more voracious than it was in previous times. The "selling points" of television are its immediacy and its ability to purvey graphic images of disaster, but such is the lack of depth in most televised reporting that few people end up with a clear idea of the risks entailed by the events being reported—or the complexity of the causes that usually lie behind disasters and crises.

Negative Aspects of the News Media

The process of communication between the media and the public is powerful but imprecise. It has both negative and positive sides. However, neither disaster management officials nor the general public has much faith in the media's ability to report news about disasters in a responsible, sober, and accurate manner.

Overall, media coverage of disasters tends to be unsystematic and unsustained. It may suffer from lack of accountability, prejudice, sensationalism, sloppiness, political partiality, ethnocentric bias, and the perpetuation of rumors and misassumptions. Students of the media in disaster have noted that news outlets seldom contribute much to the understanding of risk levels, the causes of disaster, or what can be done to reduce risks. Moreover, there is a considerable duality between domestic and foreign reporting. In the latter case, the visit of the reporter to the area may be too brief to gain an accurate impression of what is going on, and he or she may have a weak understanding of the local language, culture, and geography. Bias is a particularly thorny problem in international news: in addition to any prejudices that they manifest, reporters may distort the reality of the situation to the angle judged to be of most interest to the public for whom the story is destined.

Although attempts have frequently been made to provide disaster education for journalists, they tend to be generalists and have little interest in learning the details of what is involved in a disaster. News is filtered by both the perception of people interviewed and that of the journalist himself or herself. Research shows that this seldom extends far beyond the immediate post-impact phase, leaving the longer-term and pre-disaster periods relatively unreported.

Because journalism dictates that every day the front pages of newspapers, or the headlines of television and radio broadcasts, must differ from the previous day's offerings, the disaster may be dropped long before it ceases to be relevant. On the other hand, massive publicity may increase the "convergence reaction" and bring large influxes of people unnecessarily into the disaster area, including hordes of reporters and television crews. Transportation, accommodation, communication, and information systems can be overloaded by the demands of the media at a time when they are needed for search and rescue. Finally, the credibility of authorities who are responsible for disaster relief can be affected by negative reports in the media, especially because journalists will exert intense pressure on the authorities to supply information at a time, shortly after the impact, when the situation may be far from clear.

One serious and persistent problem with journalism is the tendency to report misconceptions and rumors as if they were the truth. The news media have consistently perpetuated the common "myths" about disaster, including social breakdown, panic, flight, psychological dependency, competition among victims for resources, violence, and looting. The most persistent "myth" concerns panic, which in reality is a rare and very short-lived phenomenon, yet is routinely treated in news reports as if it were prevalent. This is part of the news media's tendency to perpetuate the "Hollywood model" of disaster, in which societal breakdown occurs, revealing the individualistic, selfish, competitive "inner savage" in people. The reality is usually the opposite: the emergence of a "therapeutic community" in which people act positively for collective benefit, a situation that is apparently less attractive to journalists than the "disaster movie" interpretation. Finally, the media have a tendency to present disasters as sudden, unpredictable, abnormal events. In reality, they are usually predictable enough to be relatively normal occurrences.

There is a basic division between responsible and irresponsible news media, which, however, is not always a net distinction. The former will research a situation thoroughly and report as objectively as possible, while the latter (often known as the "tabloid press," or its visual or audio equivalent) will invent many of the details of the story and receive others from unchecked secondary sources. This distinction has existed since time immemorial, but in the digital age it has been joined by a new, more sinister class of media. Web sites that offer news with a political slant are proliferating. They tend to use information selectively in order to make political capital out of disasters. This was particularly evident during the aftermath of the Haiti earthquake of January 2010, where it made much political capital out of praising or criticizing interventions by the United States and, in particular, President Barack Obama. It did not represent objective, unbiased reporting.

Positive Aspects of the Media's Role

The problems with inaccurate and biased reporting mean that many emergency responders are extremely wary of collaborating with reporters. However, there is a positive side to the media's role in disaster aftermaths. Most journalists want to get the story right. If treated fairly and without favoritism by the authorities, most media representatives will collaborate willingly and provide a public information service of value to both emergency managers and the public. By careful, honest management of the media, rumors can be stopped, confusion avoided, the public educated, and the emergency workers left free to do their jobs properly. Thus, the media can be induced to convey information on the seriousness, scope, duration, and effects of the disaster. They will document the progress of rescue, relief, and recovery operations and help educate the public about disasters. The media, which naturally tend to share resources (such as film footage) in disasters, may help set up a pool of accredited journalists, providing this is done impartially. Emergency managers need to understand the needs of the media: radio needs information quickly, television requires a startling visual impact and sense of immediacy, and newspapers want access to deeper knowledge and more detailed graphics.

Science and the Media

Given the need to explain extreme natural phenomena as well as a wide variety of consequences of disaster, the relationship between scientists and news reporters is particularly important. Scientific information is often difficult to make intelligible to people who lack an education in the sciences. This is especially true given that science is frequently beset by controversy and not always able to furnish a cut-and-dried answer to the pressing problems caused by disaster. Unfortunately, dissent and controversy among scientists can have a very negative impact on reporting. Alternatively, reporters may distort and overdramatize scientific information in order to make it more newsworthy. Finally, reporters cannot always distinguish bona fide scientists from credible charlatans, whose principal aim is to gain publicity for themselves or their ideas, especially as the two categories are not always mutually exclusive.

Virtual Reality?

The magnitude 6.8 earthquake of November 23, 1980, in southern Italy devastated 36 mountain villages. In one of them, only the local coffee bar, a community asset, remained functional. It was attached by improvised connections to water and electricity supplies. Around it was a scene of destruction with buildings reduced to rubble. One day shortly after the earthquake, a researcher observed that the bar was full of local people who had survived the disaster and whose attention was fixed upon a television. Flickering across the screen was a film of a devastated village, with a coffee bar in which people were watching television. The observer could be forgiven for wondering what reality means in the television age. The question is all the more pertinent in the age of the Internet and social media, in which a story (a tweet, video clip, digital photograph, or written report) can "go viral" and be seen or downloaded by so many people that it becomes part of the process of making news. One problem with the "unofficial" media beloved of the Internet age is that they can as easily propagate false or unreliable news as they can disseminate reliable, verifiable information. This observation can easily be tested by using an Internet search engine to look up sites that deal with the controversial topic of earthquake prediction. Reliable, scientifically verified information can be obtained from the U.S. Geological Survey's sites, but these are visually no more authoritative than the sites set up by charlatans.

Disaster has always carried an element of spectacle, but this has been vastly amplified in the modern world. Medieval soothsayers have been replaced by media-savvy "gurus." In half a century, victimhood has been transformed from a disgrace to a state in which victims are the public purveyors of moral outrage and some may become media personalities in their own right. Through media coverage, disaster has acquired a new symbolism and a changed set of values compared to its image in the past. Whether they are practical or symbolic, forms of participation are changing with the development of social media and the ability to propagate information—regardless whether it is true of false. So rapid, momentous, and immediate are these changes that at present it is probably too early to predict where they will lead.

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See Also: Crisis Communications; Electronic Media; Information Asymmetry; Information Vacuums; Mass Media; Social Media.

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Noncommunicable Diseases

Diseases that are not transmitted from one person to another are noninfectious diseases and by definition, noncommunicable diseases. Noncommunicable diseases include both rapid/sudden onset (acute) as well as slow progressing and lengthy duration (chronic) diseases. Globally, noncommunicable diseases are the leading cause of mortality, accounting for 36 million out of 57 million (63 percent) deaths annually. Annually, over three-quarters (77 percent) of the developed world and one-third (37 percent) of the developing world's mortality are attributed to noncommunicable diseases. In low-income and middle-income countries, 80 percent of the deaths are attributed to noncommunicable diseases annually. The United Nations estimates that by 2030, over 50 million people will die annually from noncommunicable diseases.

There are many different types of noncommunicable diseases, which can be both acute and chronic. Examples of acute noncommunicable diseases include appendicitis, cataracts, traumatic injuries (e.g., automobile accident or gunshot wounds), overdose of drugs or alcohol, or poisoning. Examples of chronic noncommunicable diseases include asthma, Alzheimer's disease, diabetes, fibromyalgia, heart disease (e.g., arrhythmias/rhythm irregularities, heart attack/failure, and valvular heart disease), hypertension, cirrhosis (from alcoholism), hypertension, hypercholesterolemia, glaucoma, osteoporosis, and various arthritis and cancer conditions (i.e., breast, prostrate, lung, and colorectal cancer). Other noncommunicable disease examples include autoimmune diseases and mental health conditions. Even though there are many different types of noncommunicable diseases, four noncommunicable diseases account for approximately 80 percent (over 30 million) of yearly deaths. These four are cardiovascular disease (17 million), cancer (7.6 million), respiratory disease (4.2 million), and diabetes (1.3 million). Noncommunicable diseases affect men and women almost equally.

Causes and Risk Factors

Determining the exact causes of noncommunicable diseases is difficult because there can be several different causes for the same disease. Contributing factors to noncommunicable diseases include a number of factors, such as biological, lifestyle (e.g., behavioral risk factors), and the social determinants of health factors.

Biological

The biological factors include such things as genetic disorders (e.g., abnormalities, predisposition, and inherited), early life origin (e.g., low birth weight), excess body weight (high BMI), hypertension, and diabetes (type 2). Noncommunicable diseases from genetic disorders are caused by single-gene defects, genetic predisposition, and congenital malformations. There are over 9,000 possible single-gene disorders, resulting in conditions like hemoglobin disorders, hemophilia, sickle-cell anemia, and cystic fibrosis. Genetic predisposition is based on a person's having the presence of a gene; however, having the gene or genes does not guarantee acquiring or being resistant to a noncommunicable disease. In addition, if the disease is linked to behavioral or environmental factors, it becomes more complex and referred to as a multi-causation disease. Congenital malformations are genetic conditions that exist before birth. Annually, there are an estimated three million infants born with a major congenital malformation, such as heart defects, spina bifida, cleft palate, and Down syndrome (e.g., chromosomal abnormality).

Behavioral Risk Factors or Lifestyle Factors

Lifestyle risk factors are the repeated purposeful activities of life that a person engages in that contribute to the development of noncommunicable diseases. Common lifestyle factors such as poor diet, physical inactivity, tobacco use, inappropriate use of alcohol, and excessive exposure to sunlight and pollution can cause a noncommunicable disease. For example, a poor diet of no fruits can lead to scurvy (e.g., lack of vitamin C), or eating too little food can result in malnutrition. Further, having an unhealthy diet might result in the early onset of type 2 diabetes. Physical inactivity can result in increased BMI or even obesity. Tobacco use, such as smoking, has been linked to developing cardiovascular disease (CVD) and chronic obstructive pulmonary disease (COPD). Prolonged exposure to the sun can result in skin cancer, and exposure to pollution can result in chronic respiratory diseases, asthma, or cancer.

Social Determinants of Health

The social determinants of health are the social environments in which one is born, develops, lives, works, and ages, all of which can contribute to or prevent noncommunicable diseases. Some social determinants that influence persons' or groups' overall health are a lack of health care, limited or nonexistent health policies, and the social, political, and economic resources of the individual, family, state/province, and nation. These social determinants of health are largely responsible for the unequal distribution of health resources and a contributing factor in the differences in health status of people within and between countries. Examples of the social determinants of health include one's socioeconomic status, living and working conditions, environmental factors, housing, and urbanization and globalization.

Each of these contributing factors (e.g., biological, lifestyle, and social determinants of health factors) can be the source of a noncommunicable disease, and they can also work in combination with each other to produce a noncommunicable disease. Many noncommunicable diseases are referred to as multi-causation diseases, such as coronary heart disease, which can be the result of biological (genetic, or inherited), behavioral (smoking, poor diet, and lack of exercise), and the environment (stress factors), all of which significantly contribute to the disease. In other words, heart disease is a combination of all these factors and thus viewed as multi-causation. Another example is diabetes, which is a multifactorial disorder—the result of multiple gene mutations that interact with lifestyle and environmental causes.

Preventable Risk Factors

Prevention is based on reducing or eliminating the primary risk factors of noncommunicable diseases.

There are a number of preventable risk factors associated with noncommunicable diseases, which are modifiable and nonmodifiable. Modifiable determinants are factors that can be changed at the community level and include ensuring that people have adequate food, access to education (formal and health related), health care and medical services, employment, sanitation, and housing, and limited exposure to environmental and occupational hazards. At the individual level, the modifiable determinants include knowledge about good health practices, such as proper diet, maintaining an appropriate body weight, exercising, wearing seat belts, not engaging in risky activities, wearing sunscreen, refraining from tobacco use, and limiting alcohol use. Nonmodifiable determinants are those factors that are beyond the individual's ability to control, such as their age, sex, race/ethnicity, genetic tendencies, or heredity.

Surveillance for early detection of noncommunicable diseases is important in reducing the risk. Providing communities with access and equipment for regular screenings for high blood pressure, high cholesterol, diabetes, and other chronic diseases is critical in preventing and reducing risk of developing a noncommunicable disease. Individuals should be encouraged to engage in self-examinations (e.g., for skin, breast, and testicular cancer), have regular dental checkups, and have health and medical screenings (i.e., yearly Pap smear, prostate-specific antigen [PSA], mammogram, diabetes, heart and respiratory diseases, glaucoma, and hypertension). Any diagnosis of a noncommunicable disease should be promptly treated.

Noncommunicable diseases can be preventable and controllable, if interventions target the five main modifiable risk factors of elevated blood pressure, elevated cholesterol, tobacco use, harmful use of alcohol, and being overweight. Annually, over 21 million people die as a result of these five conditions. Specifically, 7.5 million die from elevated blood pressure, 2.6 million from elevated cholesterol, 6 million from tobacco use, 2.5 million from alcohol, and 2.8 million from being overweight. Basic interventions are smoking cessation, improved diet, increased physical activity, and discontinuing the harmful use of alcohol. The World Health Organization (WHO) estimates that by eliminating the five risk factors and addressing poverty and the social determinants of health, 75 percent of diabetes (type 2), strokes, and heart disease–related deaths, as well as 40 percent of cancer deaths could be prevented. Without interventions, these noncommunicable disease will continue to increase. For example, the prevalence of diabetes is around 140 million worldwide, and it is projected to grow to 300 million by 2025. By 2020, tobacco–related mortalities are projected to grow to 7.5 million.

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See Also: Centers for Disease Control and Prevention (CDC); Public Health Surveillance; World Health Organization (WHO), UN.

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Nongovernmental Organizations

Nongovernmental organizations (NGOs) play an active role in all four phases of disaster and emergency management: mitigation, preparedness, response, and recovery. The members of the National Voluntary Organizations Active in Disaster (NVOAD) are the most influential voluntary organizations related to crisis in the United States. During crisis and emergency response, mass care is the most common service provided by nongovernmental organizations, but the NGOs are not sufficient; they have their own limitations.

Nongovernmental organizations—also known as volunteer agencies, nonprofit organizations, or the third sector—play an important role in providing social services to the public. In this article, all these terms will be used interchangeably, though

Table 1 National voluntary organizations active in disasters

Name	Mission/main works related to disasters
ACTS World Relief	ACTS World Relief "unites, equips and deploys human resources and rapid emergency response assets in emergency and community service, and in doing so, demonstrates the compassion of God, regardless of race or religion."
Adventist Community Services (ACS)	ACS serves communities "in Christ's name" within the United States, providing humanitarian relief and individual and community development ministry.
All Hands Volunteers, Inc. (AHV)	AHV is a U.S.-based nonprofit organization that provides hands-on assistance to natural disaster survivors and response services to communities in need.
Alliance of Information and Referral Systems (AIRS)	AIRS is a professional association, primarily in the United States and Canada, helping to bring people and services together.
American Red Cross (AMR)	The AMR has been the United States' premier emergency response organization since its founding in 1881. It offers neutral humanitarian care to the victims of war and natural disasters with the aim of preventing and relieving suffering. In addition, the AMR also offers compassionate services in five other areas: community services that help the needy; support and comfort for military members and their families; collection, processing, and distribution of lifesaving blood and blood products; educational programs that promote health and safety; and international relief and development programs.
American Radio Relay League, Inc. (ARRL)	The ARRL is an organization to promote and advance the art, science, and enjoyment of amateur radio. It is the primary source of information about what is going on in the ham radio world.
Billy Graham Rapid Response Team (BGRT)	The BGRT is "a ministry of crisis-trained volunteer chaplains who deploy in the aftermath of a disaster to respond to the emotional and spiritual needs of people in crisis."
Brethren Disaster Ministries (BDM)	The BDM restores hope for the most vulnerable disaster victims by engaging volunteers to repair and rebuild disaster-damaged homes, and by providing grants to support the disaster recovery efforts of faith-based partners. Its Children's Disaster Service program meets the needs of children by setting up child care centers.
Buddhist Tzu Chi Foundation	The Tzu Chi Foundation's mission is to educate the rich to help the poor and inspire the poor to realize their riches. It also extends activities into medicine, education, and humanistic culture areas.
Catholic Charities USA	The mission of Catholic Charities is to "provide service to people in need, to advocate for justice in social structures, and to call the entire church and other people of good will to do the same."
Christian Reformed World Relief Committee (CRWRC)	The CRWRC responds to the needs of people who suffer from poverty, hunger, disaster, and injustice.
Churches of Scientology Disaster Response (COSDR)	The COSDR is an embracive program of the Church of Scientology to provide community service, disaster relief, and emergency response.
Church World Service (CWS)	The CWS aims to build interfaith and intercultural coalitions to eradicate hunger and poverty, and to promote peace and justice by supporting sustainable grassroots development, disaster relief, and refugee assistance.
City Team Ministries (CTM)	CTM is an organization serving the poor and homeless in cities by providing "life-saving food, shelter, clothing, recovery programs, youth outreach, camp for at-risk inner-city kids, discipleship and other essential care 365 days a year,"
Convoy of Hope	Convoy of Hope is a faith-based organization providing children's feeding initiatives, community outreaches, disaster response, and partner resourcing worldwide.
Cooperative Baptist Fellowship (CBF)	The CBF is a faith-based organization that provides service and assistance in the areas of poverty and transformation, disaster response, international outreach, church starts and faith sharing, justice and peace making, health care, economic development, and education.
Episcopal Relief and Development (ERAD)	ERAD focuses on alleviating hunger and improving food supply, creating economic opportunities and strengthening communities, promoting health and fighting disease, and responding to disasters and rebuilding communities.

Name	Mission/main works related to disasters
Feeding America	The mission of Feeding America is to feed America's hungry through a nationwide network of member food banks and engage the country in the fight to end hunger.
Feed the Children	Feed the Children provides hope and resources for those without life's essentials.
Habitat for Humanity International	Habitat helps build and repair simple, decent, affordable houses with people who lack adequate shelter worldwide.
HandsOn Network (HON)	HON helps individuals, companies, and HandsOn volunteers solve pressing problems through volunteering: "It inspires, equips, and mobilizes people to take action that changes the world."
Hope Coalition America (Operation Hope) (HCA)	HCA improves the economic quality of life for individuals, families, and communities through economic education and empowerment. The ultimate mission is to eradicate poverty by focusing on the 21st century's next civil rights movement.
HOPE Worldwide, Ltd	HOPE Worldwide is an international charity that "changes lives by harnessing the compassion and commitment of dedicated staff and volunteers to deliver sustainable, high-impact, community-based services to the poor and needy."
Humane Society of the United States	The Humane Society celebrates animals and confronts cruelty both nationally and globally.
International Critical Incident Stress Foundation (ICISF)	The mission of the ICISF is to "provide leadership, education, training, consultation, and support services in comprehensive crisis intervention and disaster behavioral health services to the emergency response professions, other organizations, and communities worldwide."
International Relief and Development (IRD)	The IRD is a nonprofit organization responsible for implementing relief, stabilization, and development programs worldwide. Its mission is to reduce the suffering of the world's most vulnerable groups and provide the tools and resources needed to increase their self-sufficiency.
Jewish Federations of North America	Jewish Federations focuses on the social welfare, social services, and educational needs, especially for Jews worldwide
Latter-day Saint Charities	LDS Charities helps people of all nationalities and religions by relieving suffering, helping people help themselves, and providing opportunities for service through emergency response and local development programs.
Lutheran Disaster Response (LDR)	LDR brings together the energy and efforts of Lutherans from around the United States to respond to natural and human-caused disaster.
Mennonite Disaster Service (MDS)	The MDS is a volunteer network that responds in Christian love to people affected by disasters in Canada and the United States. The main focus is on cleanup, repair, and rebuilding homes.
Mercy Medical Airlift (MMA)	The MMA provides charitable transportation services to those in need of medical air transportation.
National Association of Jewish Chaplains (NAJC)	The NAJC is the professional organization of Jewish chaplains worldwide.
National Baptist Convention USA	The mission of the Convention is to "fulfill the Great Commission of Jesus Christ through preaching, teaching, and healing."
National Organization for Victim Assistance (NOVA)	NOVA's mission is "to champion dignity and compassion for victims of crime and crisis."
Nazarene Disaster Response (NDR)	NDR is "Nazarenes mobilizing for disaster through Readiness, Response, and Recovery."
NECHAMA: Jewish Response to Disaster	NECHAMA is the Jewish community's disaster response organization that offers help to all people, especially the vulnerable, regardless of religious affiliation.
Noah's Wish	Noah's Wish is an animal welfare organization dedicated to rescuing and sheltering animals in disasters throughout the United States.

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Name	Mission/main works related to disasters
Operation Blessing International Relief and Development Corporation (OBI)	OBI is a humanitarian organization dedicated to demonstrating God's love by alleviating human need and suffering in the United States and around the world through core programs of disaster relief, medical aid, hunger relief, orphan care, water wells, and community development.
Presbyterian Church in America (PCA) Mission North America (MNA)	MNA Disaster Response provides support to PCA churches in disaster-affected communities through human resource (professional and voluntary) mobilization, funds and donation distribution, and spiritual encouragement services.
Presbyterian Disaster Assistance (PDA)	The PDA focuses on long-term recovery of disaster-impacted communities, providing training and disaster preparedness for presbyteries and synods.
Samaritan's Purse (SP)	The SP provides spiritual and physical aid to people hurting around the world. The emergency relief program offers food, water, temporary shelter, and other critical needs to victims of natural disaster, war, disease, and famine.
Save the Children	Save the Children is "an independent organization creating lasting change in the lives of children in need in the United States and around the world." It provides food, medical care, education, and long-term recovery programs for communities rebuilding after disasters.
Society of St. Vincent de Paul	St. Vincent de Paul offers person-to-person service to individuals in need. Also, it plays a role of advocacy for those who are defenseless or voiceless.
Southern Baptist Convention/North American Mission Board	The Southern Baptist Convention provides disaster relief both domestically and internationally.
Salvation Army	The Salvation Army is a faith-based organization to meet human needs "in God's name" without discrimination.
United Church of Christ (UCC)	The UCC provides spiritual, physical, financial, and psychological assistance to people and communities impacted by disasters.
United Methodist Committee on Relief (UMCOR)	The UMCOR is a global humanitarian aid organization aimed at alleviating human suffering with open hearts and minds toward all people.
United Way Worldwide	United Way improves lives by mobilizing the caring power of communities around the world to advance the common good.

they have slight differences according to the varied definitions. Volunteer agencies have been important disaster relief resources for a long time. For example, the American Red Cross has been the United States' premier emergency response organization since it was founded in 1881. It is also designated to provide mass care services for disaster survivors by the U.S. Congress. Today, the American Red Cross responds to about 70,000 disasters each year, from large-scale catastrophes to small disasters like house fires.

National Voluntary Organizations in Disaster

The most influential volunteer organizations in the United States are the members of the National Voluntary Organizations Active in Disaster (NVOAD). In the summer of 1970, representatives from seven voluntary agencies—the American Red Cross, Christian Reformed World Relief Committee, Mennonite Disaster Service, National Catholic Disaster Relief Committee, Seventh-day Adventists, Society of St. Vincent De Paul, and Southern Baptist Disaster Relief—came together in Washington, D.C., to form NVOAD in response to the challenges many disaster organizations experienced following Hurricane Camille in 1969.

There are two types of members in NVOAD: national members and state/territory VOADs. The current 48 national members and their missions/works related to disasters are listed in Table

Table 2 Services provided by the American Red Cross after Hurricane Katrina in 2005

Services	**Detailed information**
Response	
Sheltering	Opened more than 1,400 shelters in 31 states and the District of Columbia and sheltered nearly 450,000 evacuees.
Food/feeding	More than 90 kitchens served more than 68 million hot meals and snacks to evacuees and responders.
Health and emotional care	Deployed nearly 4,600 licensed health and mental health professionals, more than any relief operation in recent history.
Relief supplies	Delivered more than 2,500 truckloads of food items, as well as ice, coolers, sunscreen, insect repellent, garbage bags, hand sanitizer and other need supplies directly into the hands of survivors. Also, more than half a million Red Cross comfort kits with hygiene supplies and cleanup kits with cleaning supplies were distributed.
Reconnecting loved ones	Launched the Family Links Registry, which was available online or by phone, to reconnect families to respond people's needs to find their loved ones. Internet and phone services were set up in many Red Cross shelters. More than 340,000 people registered online, and the hotline received more than 350,000 calls. The Red Cross became a trusted source of information.
Financial assistance	Provided emergency financial assistance to survivors to purchase life's essentials. Also, a toll-free financial assistance hotline was created for families to meet urgent needs. In total, more than 1.4 million families—nearly 4 million people—received vital emergency assistance from the Red Cross.
Long-term recovery	
Planning	More than 13,000 families received long-term recovery planning and advocacy services from trained Red Cross case managers.
Mental health	Provided mental health and substance abuse treatment to more than 22,500 people.
Financial assistance	More than 8,200 families received recovery financial assistance.
Funding other nongovernmental organizations	The Red Cross funded more than 200 other organizations in more than 30 states through the Hurricane Recovery Program. More than 165,000 adults and youth received capacity building services through 16 behavioral health programs awarded by the Red Cross, and more than 150,000 people were involved in community resilience building.

1. National VOAD also includes state VOAD members from all 50 states and territory members from five U.S. territories.

However, it should be noted that the NVOAD itself is not an organization and does not deliver disaster response and recovery services. It is only a forum for organizations, fostering communication, coordination, collaboration, and cooperation among nonprofit organizations active in disasters in order to better serve people impacted by disasters. Like the National VOAD members listed above, most volunteer agencies related to disasters are faith-based organizations. They provide services before, during, and after disasters, especially services targeted toward vulnerable or disadvantaged populations like the elderly, children, and the disabled. The idea of empowering people and local participation are main themes for most of these organizations. The most common services from volunteer agencies are mass care and emergency assistance soon after disasters. For example, they help establish temporary shelters or homes; distribute food, water, and clothing to disaster victims; and provide first aid and health care if necessary. Mental health services and spiritual relief are other common services provided by NGOs. Some organizations can perform damage assessment, identification, debris removal, communication, transportation, relocation, or other more professional services after crisis. Besides emergency response, volunteer organizations also help vulnerable people in communities through financial assistance, skills education, and other aid, for better disaster recovery, mitigation, or preparedness. How to empower people through community outreach, training, education, advocacy, and participation is the general work of NGOs during noncrisis times. Some organizations also provide special services to people with special needs like translation, special dietary needs, and pet care that might be difficult to meet.

The American Red Cross in Hurricane Katrina

The American Red Cross is a nonprofit, charitable, congressionally chartered organization. One of its main responsibilities is to "maintain a system of domestic and international disaster relief, including mandated responsibilities under the National Response Plan coordinated by the Federal Emergency Management Agency (FEMA)." Before Hurricane Katrina, the American Red Cross was the "primary agency for mass care" during disasters in the United States; now it plays a support role to facilitate FEMA's mass care function under the Emergency Support Function 6—Mass Care, Emergency Assistance, Housing and Human Services Annex. The response to Hurricanes Katrina, Rita, and Wilma in 2005 is the American Red Cross's largest response to a single, natural disaster in its history. About 250,000 Red Cross workers, 95 percent of whom were volunteers from all U.S. states and territories, responded to help and provided services to more than four million people in nine states.

The Red Cross not only served millions of Americans during the emergency situation after Hurricane Katrina but also provided services to victims and affected communities for long-term recovery. During the response phase, the Red Cross provided sheltering, feeding, health and emotional care, financial assistance, information services, and other essential services to millions of people. During the long-term recovery period, many individuals, families, communities, and small NGOs received assistance and help from the American Red Cross. The details of services provided by the American Red Cross after Hurricanes Katrina, Rita, and Wilma in 2005 are shown in Table 2.

Limitations of NGOs in Disaster Management

NGOs are agile and less bureaucratic than government agencies, but their limitations in resources, accountability, and coordination can make it hard for them to fulfill the response needs in catastrophes, and sometimes undermine their effectiveness and efficiency in emergency response. For example, in the case of Hurricane Katrina, many NGOs from other parts of the United States could not access the local communities affected by the hurricane, and services could not be delivered to needy survivors. Also, the donors' preferences would affect the equitable distribution of services, as well as the needs in all phases of the disaster cycle. As shown in the table of National Voluntary Organizations Active in Disaster, many of these organizations are faith based, and many of them have religious preferences or special targets. During the initial period of Hurricane Katrina, some black activists contended that the Red Cross provided better services in mostly white areas than in black areas. Meanwhile, compared with mitigation and long-term recovery, donors tended to be more interested in immediate disaster relief.

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See Also: Collaboration; Coordination; Coping Capacity and Response Capability; Disaster Recovery; Doctors Without Borders; Emergency Support Functions; Federal Emergency Management Agency (FEMA); Mass Care; Red Cross and Red Crescent; Salvation Army; Volunteer Coordination; World Health Organization (WHO), UN; World Water Relief.

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Nonlinearity

Nonlinearity is a central idea of chaos theory and distinguishes how chaos theory conceptualizes systems differently from other scientific paradigms. Nonlinearity is used by a multitude of scholars in various disciplines to explain vast and often disproportional changes in a system through complex and often unknown interactions within a system. These complex system interactions have the potential to create nonlinear effects with unpredictable and seemingly random ramifications to the entire system. The concept of nonlinearity warns crisis management professionals against narrow and unreflective actions to mitigate a crisis that do not account for the complexity of relationships within a system coupled with a rapidly changing environment.

Chaos Theory

Chaos theory is often referred to as the "new science," and one of the reasons for this description stems from a departure from a traditional scientific worldview of linear systems. The worldview of linear systems is based on laws such as those created by Sir Isaac Newton and used to identify or attempt to identify cause-and-effect relationships that enable scientists to predict the direct dependence of one variable on another. Although the foundations of most disciplines are grounded in this notion of linearity, this narrow conception of systems has had limited success in predicting outcomes beyond the very short term. Scholars in a variety of disciplines, in both natural and social sciences, have been forced to reinvent their worldviews to account for the increasing complexity of their observations.

To account for more complexity, chaos theory embraces a "neo-Newtonion" manner of conceptualizing how systems work. In this modified systems approach, systems are seen as nonlinear, dynamic, or chaotic (nonlinear will be used for the duration of this article) instead of linear. A nonlinear system is fundamentally different from a linear system because nonlinear systems are not governed by proportional cause-and-effect relationships.

Within a traditional linear system perspective, Newton's third law explains that every action has an equal and opposite reaction. Thus, an event such as a crisis situation should, from a Newtonian perspective, create a proportional reaction within the system and unfold in a predictable manner from a known set of initial conditions. However, chaos theory scholars present much evidence to suggest that this relationship is not accurate for many, if not all, systems.

For example, when chaos theory is applied to a recognized nonlinear system such as the weather, very small changes to the initial conditions of a weather system dramatically impact the way that system evolves. These very small changes in the initial conditions of a weather system may actually create an exponential—not

AUTHORIZED PARKING ONLY 7AM.4PM
SLOW
CHILDREN AT PLAY
WATER
OK
DRINKING UNTIL FURTHER NOTICE

A homemade sign updates residents of a neighborhood in Slidell, Louisiana, on September 12, 2005, that their drinking water supply, once contaminated from the effects of Hurricane Katrina, is now safe to drink. Numerous utilities in many Louisiana communities were severely damaged by the storm, illustrating how many social systems can be affected by the evolution of a natural system. On a sub level, drinking water was contaminated by the failure of a human-built potable water system. On a supra-level, the economy was affected.

proportional—reaction in the system, so that even after a short period of time it is difficult to identify that two systems began with very similar sets of initial conditions.

Nonlinearity accounts for the vast differences in the outcomes of these nearly identical weather systems by explaining that the small differences in the initial conditions result in some parts of the system amplifying certain conditions exponentially rather than proportionally because of complex relationships between the parts of the system. The changes may appear unrelated to the initial stimuli, but because of the system's complexity, the stimuli found within the initial conditions initiated a chain reaction that led to a large shift in the system's outcome.

These complex relationships may be partially understood by traditional scientific inquiry; however, because of the interdependence between all parts of the system, traditional scientific methods have often failed to capture reliable, direct causal relationships that are able to predict how a system will be affected past the very short term. Thus, we are able to see how weather reports can change dramatically on a daily or in some cases even hourly basis.

Additionally, both natural and social systems tend to evolve in a hierarchical manner. Thus, a system can be simultaneously part of a subsystem and a suprasystem, which illustrates the need for a complex relational perspective in understanding how a system can be influenced by seemingly unrelated or random events in the environment. For example, when Hurricane Katrina struck the Gulf Coast in 2005, many systems were affected by the evolution of this natural system. On a sublevel, the drinking water of many species was contaminated by the failure of a human-made levy system. On a supra-level, the economy of the United States was affected, which in turn affected the economy of the entire world. These conditions are among the many that affected the local and national responses to the crisis. If emergency managers create artificial system boundaries in an effort to reduce the complexity of the situation, there is a potential for blind spots to emerge in the response. Overlooked interactions between natural and social systems may profoundly affect the system and the attempts to mitigate an emergency.

Conclusion

Nonlinearity is a useful concept for all stages of crisis management. In preparing for a crisis, nonlinearity showcases the need for practitioners to look at the complexity and potential interactions of multiple systems to create a more robust crisis management plan. Additionally, nonlinearity can be applied to leadership and decision making during a crisis.

Nonlinearity illustrates the need for practitioners to be mindful of small changes that may disproportionately affect the situation they are facing and make reflective decisions to mitigate a crisis while constantly reevaluating the decisions as new variables begin to interact within the situation. Finally, during the recovery from a crisis, nonlinearity is useful for embracing systemic learning from the crisis and how an event creates large and lasting changes to the system.

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See Also: Cascading Crisis; Chaos Theory; Cosmology Episode; Interdependence; Normal Accident Theory.

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Normal Accident Theory

Normal accident theory (NAT) focuses on organizational structure and suggests that crisis triggers are inevitable or “normal” in complex, tight-coupled technological systems. Such systems yield unexpected multiple interactions between independent failures, while the combination of complexity and tight coupling makes system accidents inevitable. This theory defines such accidents as “normal accidents” or “systems accidents.” NAT was proposed and developed in the early 1980s by Charles Perrow, a sociology professor studying the impact of large organizations on society. Perrow attempted to translate the analysis of the organizational aspects of the Three Mile Island nuclear accident into a general formulation, which originated NAT. Other industries, activities, and organizations that have been examined through the NAT framework include the airline industry, mining, dams, weapons programs, oceanic industries, and the space program.

Normal or Systems Accident

“Normal accident” or “systems accident” refers to any unintended and untoward event that disrupts the ongoing or future outputs of systems. According to NAT, a system is divided into four levels: the first level is based on the individual part (e.g., a value); the second level is functionally made up of the related collections of individual parts; the third level is subsystem consisted with the arrays of units; and the fourth level is combined with subsystems, which makes a system. In addition, the environment lies beyond the system. In this scheme, any failure at the first two levels is defined as an incident rather than an accident, where the engineered safety features (ESFs) incorporated in systems, such as redundant components or emergency shutoffs, would prevent incidents from transitioning into accidents. The disruptions are only qualified as accidents at the third or fourth level, when the failures of lower-level components defeat ESFs, escalate to higher levels, and culminate in a component failure accident. Therefore, better-designed ESFs (e.g., preventive maintenance, operator training, etc.) could avoid component failures in an organization.

Rather than the component failure accidents, the operator errors, and all the other anthropic

Case Study: The Ford Pinto

The case of the Ford Pinto can be seen as a component failure accident. This type of accident involves one or more component failures that are linked in an anticipated sequence, meaning that although the accident is normal, it had the possibility of being foreseen and corrected. In 1970, the Ford motor company of Detroit, Michigan, introduced a compact car model named the Pinto (with a Mercury variant, the Bobcat, being introduced later). The Pinto was designed to compete with the increasing threat from foreign manufacturers who were producing automobiles that were smaller, were cheaper, and achieved better gas mileage. At the time the Ford Pinto was introduced, the industry average from the time of concept to production was 43 months. The Ford Pinto was rolling off the assembly line after only 25 months. This was a company decision made to react to market pressures and competition. Moreover, the car was to be produced with stringent production limits that included a maximum weight of 2,000 pounds and a maximum cost of $2,000.

Midway through pre-production, safety tests revealed that the Pinto's fuel tank could be compromised when a low-speed rear-end collision occurred. Testing indicated that the fuel tank failures were the result of marginal design features. Studs from the rear axle house could puncture holes in the fuel tank, causing spilled gasoline to be ignited by subsequent sparks. Several avenues existed for fixing the flaws in the Pinto. One of the remedies to resolve the issue would have only cost $11 to implement. However, given the cost limits imposed on creation of the model, this option was not adopted. Other reasons changes were not made included a cultural belief that small cars were useful and that safety does not sell. Also, a cost-benefit analysis using figures from the National Highway Traffic Safety Association concluded that it was a better business decision to ignore the design issues and compensate any victims that came forward claiming injuries or deaths caused by design features.

The demands of the 2,000-pound maximum weight and $2,000 cost represent a tightly coupled system with a more time-dependent process. Another characteristic of tightly coupled systems is that the sequence of steps in a process exhibits little or no variation. Thus, tooling of production plants was under way while safety tests were being conducted. Changes in production at this time may have required changes in other parts of the system, and this was viewed as a threat to the production timeline. Similarly, tightly coupled systems have little slack. Every part of the process has to be completed and operating just right or it doesn't work at all.

Another component in normal accident theory is rational decision making. Absolute rationality is a type of decision making often used by engineers and economists, but it can cause problems in other types of systems. Absolute rationality can be seen in the cost-benefit analysis used by Ford as a decision to move forward on production in spite of the design features.

factors where there is no significant unexpected interaction of failures, the system accidents own to multiple failures, which interact with each other in ways that could be neither anticipated nor comprehended in some complex systems. NAT justifies the discussions of power by referring to the system perspective. This theory takes into account the wider context of a failure that ranges from mental models of individual operators to group, organizational, and industry structures, a recognition based on the grand inclusive and virtually circular systems theory of the 1960-to-1980 period.

Quadrant Matrix of Systems

Two systemic dimensions are integral to NAT's main thesis: the natural of interactions within a system and the degree of coupling among its subsystems. These two dimensions generate a two-by-two matrix, where NAT populates all the quadrants of the matrix with various types of systems: complex-tight systems (e.g., a nuclear plant), complex-loose systems (e.g., multigoal agencies and universities), linear-tight systems (e.g., dams), and linear-loose systems (e.g., a post office). NAT states that systems are the interactions of these dimension factors and focuses on tightly coupled and complexly interactive systems.

Complex interactions and tight coupling make a system susceptible to normal accidents. Complex interactions are either invisible or untimely comprehensible, occurring in unfamiliar sequences or unplanned and unexpected sequences, which would be driven by multifunctionality failures of components, physical proximity of components, limited awareness of specialized knowledge of personnel, multiple control parameters with potential interactions, and the need to decode unfamiliar or unintended feedback loops to make inferences. Tight coupling refers to the minimal time lag between the processes for a system, the simplex sequence of processing, the single method for task accomplishment, little possible slack in resources (i.e., supplies, equipment, and personnel), rigescent (stiff) buffers and redundancies, and a prescribed manner of ready resources substitution.

The theory indicates that almost all the complex-interactive and tight-coupled systems execute transformation processes, such as in nuclear plants, chemical plants, or space missions, that transform the main raw material that they work with in some fundamental way. In an organization, decentralization aids the system to cope with complex interactions, while centralization aids in coping with tight coupling. Lowering the complexity levels and decoupling of interactions in systems would lower the probability of accidents, as the very nature of the transformation process that must be executed to preclude the possibility. However, decentralization and centralization are impossibly simultaneous in a complexity interactive and tightly coupled organization, which make the organization structurally incapable of coping with system accidents. NAT thereby suggests that it may be best to abandon developing some of the more complex technologies. In addition, the theory also acknowledges that experience and training can help reduce complexity.

Debates Over High Reliability Theory (HRT)

NAT has been compared with high reliability theory (HRT) by sociology scholars. The debates were traced back to S. D. Sagan, who wrote a book in 1993 titled *The Limits of Safety*. In this book, Sagan applied both NAT and HRT to analysis of accidents and near-misses in the nuclear weapons systems in the United States during the Cold War. Sagan supported NAT's perspectives, which invited criticism from the scholar of HRT, Todd R. La Porte, in 1994.

NAT holds that because of system characteristics, accidents in complex and tightly coupled systems are inevitable regardless of the intensity of organizational efforts. HRT suggests that if the organizations take enough pains to make the workplace safe, accidents are avoidable even in complex organizations that operate hazardous technologies. NAT proponents point to the moment when accidents do eventually take place in order to support the inevitability claims, while HRT emphasizes pointing to accident-free environments that have existed for long periods. Both theories cannot agree whether the views complement or contradict each other.

Critique of NAT

NAT is criticized, mostly by the scholars prone to belief in HRT, to contain several limitations. Some scholars suggest that NAT is considered as a theory about the causes of a particular kind of accident rather than the production and maintenance of safety. The theory doesn't give an adequate explanation of the process, where the complex interactions between human actors and organizational structures are neglected in its theory articulation. NAT is put forward based on empirical studies of high-complex, tight-coupling systems; it might lack in articulating all the types of system crisis. For instance, Hopkins questioned NAT's limited relevance that only a minuscule percentage of accidents would qualify as system accidents. Consistently, some scholars also questioned whether NAT's accident is a component failure accident or a system accident. S. Shrivastava, K. Sonpar, and F. Pazzaglia criticized Perrow's NAT interpretation attributing to the intra system, which is being arbitrary; further empirical studies of liner-loose systems need to be explored. In addition, NAT is concerned about overaccepting the status quo. It is criticized to negatively affect the practical response strategies; it seems to deny the value of post-event committees of investigation and might mislead organizations toward simple denial and shift-the-blame responses during the crises.

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See Also: Air Travel; Catastrophe, Definition of; Chaos Theory; Coordination; Coupling; High Reliability Organization Theory; Incidents Versus Crises; Interoperability; Mining; Nonlinearity; Nuclear Risk; Risk Assessment.

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Normalization of Deviance

"Normalization of deviance" is a concept that refers to social processes by which decisions come to reflect an incremental acceptance of initially unacceptable deviations from the standards held by the members of a group or organization. Originally developed to explain the failure of organizations that engage in high-risk activities, the concept draws attention to patterns of decision making and to culturally conditioned procedures and routines that result in a gradual and unintentional expansion of the threshold of what is considered an acceptable residual risk of failure. By fostering an erosion of safety standards over time, normalization of deviance can increase the likelihood of catastrophic organizational failure.

A number of related concepts have been developed to explain the causes of organizational failure. They include the general tendency of complex systems to experience periodic crises (normal accident theory), the gradual uncoupling of local actions from organizational rules and procedures (practical drift), and the adverse effects that group dynamics can have on decision-making processes (groupthink). Normalization of deviance complements these explanations by drawing attention to the organization-cultural antecedents to catastrophic organizational failure.

Origin of the Concept

The term and concept *normalization of deviance* came to prominence as an explanatory mechanism in sociologist Diane Vaughan's meticulous analysis of the *Challenger* space shuttle disaster of 1986 (see case study). Contrary to the public account that drew on individual misconduct and technical (O-ring) failure as main causes of the accident, Vaughan argued that the fateful launch decision was not to be seen in isolation. Instead, it was to be understood as the culmination of a long-term process by which the safety standards at the National Aeronautics and Space Administration (NASA) had been undermined by a repeated normalization of O-ring performance anomalies.

In contrast to approaches that seek causes for organizational failures in the misconduct of individuals (operator errors), normalization of deviance directs attention to the culturally conditioned frames of reference that shape and constrain how individuals make decisions in organizations. Individual action in organizations is always situated within a context that is defined by the organization's culture—its structures, processes, and rules. Normalization of deviance suggests that the organizational context can promote worldviews that prevent organizational members from acknowledging deviations from a standard or norm as signals of potential danger.

Normalization of Deviation

The normalization of deviance suggests that decisions are heavily influenced by the organizations in which they are made. To better understand how organizations affect decision making and can thereby precipitate disastrous outcomes in high-risk environments, it is important to recognize that assessments of risk are not objectively given. Instead, they are constructed in negotiated attribution processes by which members of an organization develop collectively held expectations about the consequences of actions. According to Vaughan, three interrelated social forces mediate this process. They are the workgroup culture, the organization's culture of production, and structural secrecy. Together, these forces can precipitate a normalization of deviance.

As individuals collaborate to solve problems, they develop a local "workgroup culture" that is characterized by distinctive norms and values. This workgroup culture provides members with a shared definition of the situation they are

Case Study: The *Challenger* Launch Decision

On the morning of January 28, 1986, the space shuttle *Challenger* exploded 73 seconds after liftoff, putting a tragic end to the first Teacher in Space mission, so named for the crewmember who had been assigned to teach schoolchildren from space.

The initial assessment of the disaster identified a technical failure as cause. Unprecedentedly cold weather conditions at the time of launch had impaired the resiliency of the rubber-like O-rings that sealed a small gap in the joints of the two solid rocket boosters that were to propel the shuttle into space. Seconds after liftoff, both primary and secondary O-rings at the aft segment of the right booster had been compromised, resulting in the violent disintegration of the vehicle shortly afterward.

It was found that problems with the O-rings had been documented throughout the space shuttle program, and concerns had escalated in the year preceding the disaster. Moreover, there had been an extended telephone conference on the eve of the fateful launch, in which engineers had voiced their concerns about the effects of the cold weather on the O-rings and had advised NASA management against launching. As it became apparent that the disaster might have been anticipated and prevented, public perception came to blame managerial wrongdoings as a cause of the tragedy. It was suggested that management had given in to economic and political pressures and had prioritized launching on schedule over safety concerns.

In a detailed reconstruction of events leading up to the launch decision, Diane Vaughan contested the explanation based on individual misconduct, arguing instead that the decision to launch constituted an organizational failure caused by the repeated normalization of O-ring performance deviations. Vaughan found that the "workgroup culture" had led to a normalization of O-ring performance deviations by drawing on engineering rationales and a strong belief in the adequacy of the two-tiered O-ring system. On occasion, erosions, hot gas "blow by," joint rotations, and other deviations had each triggered a formal five-step process that resulted in technical re-evaluations of initially unacceptable O-ring performance deviations as the acceptable risk of an unlikely O-ring failure. The workgroup's recommendations were aligned with NASA's "culture of production," which had shifted from a purely technical rationale in the Apollo era of expansive space politics to one that had to merge technical, bureaucratic, and cost-efficiency mandates under severe budgetary constraints.

The resulting production pressures that NASA was confronted with further reinforced the workgroup's proposals to reevaluate performance anomalies in accordance with formally legitimized procedure. "Structural secrecy" effectively concealed the seriousness of the O-ring problem, as each successful shuttle mission corroborated the adequacy of normalization, and the workgroup's recommendations were effectively ratified in the four-tiered Flight Readiness Review that relied heavily upon the workgroup's input for engineering information and analysis.

acting in and serves as a lens through which deviations from expected performance outcomes are interpreted. As minor deviations may be symptomatic for serious root causes that might jeopardize the safety of the overarching project to which the workgroup is contributing, they may signal potential danger. However, interpreting performance deviations as signals is conditional upon the workgroup culture. Normalization of deviance sets in when members of a workgroup develop a definition of the situation that allows them to ignore signs of unacceptable potential danger. Normalization of deviance that does not immediately lead to disaster can set a precedent that confirms normalization as a viable pathway. This can entail the acceptance of further deviations that, while each insignificant in its own terms, accumulate in unanticipated ways.

Workgroups are embedded into the organization that is itself a carrier of norms and values. The organization's "culture of production" manifests in the rules, roles, and authority relations that shape the institutional environment in which workgroups operate. The culture of production subtly preselects the range of cultural scripts available to the workgroup. As long as workgroup activities are aligned with the organizational culture of production, however, the latter will generally legitimize and reinforce the workgroup's definition of the situation.

"Structural secrecy" undermines attempts by those outside the workgroup to understand the situation in its full extent. Organizational structures and the regulatory procedures in place affect how information is conveyed among the members of an organization. Ambiguous patterns of information, lack of data, and formalized assessment procedures can render signals ambiguous, weak, and routinized, thereby depriving them of salience and ultimately making their normalization more likely.

Implications for Crisis Management

When things go seriously wrong in organizations, it is common practice to seek causes in individual negligence or misconduct and to direct remedial action at those identified as responsible. However, the retrospective apportioning of responsibility to individuals obscures the interpretative frameworks, cultural ambiguities, and social constraints that organizations impart to their members at the time when decisions are being made. By sensitizing to the organizational context in which decision making occurs, normalization of deviance brings to the fore the cultural lenses through which actors perceive and interpret ongoing developments. While not denying that organizational failures can be caused by individual misconduct, normalization of deviance challenges explanations that fail to consider the organizational antecedents to catastrophic failure. When deviance has been normalized over time, organizations can fail even, and particularly, when all individuals involved conform to the established standards.

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See Also: Groupthink; High Reliability Organization Theory; Mental Models; Normal Accident Theory; Organizational Failure; Practical Drift; Residual Risk; Structural Secrecy.

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Nuclear and Radiological Weapons

Before the former Soviet Union was dissolved in 1991 and the Berlin Wall was torn down, one of the greatest fears in the United States was that of a nuclear war between the United States and the Soviet Union. Even though the threat of nuclear warfare between countries is a possibility, it is no longer the primary concern. The greatest fear now is that an individual or terrorist group could acquire a nuclear weapon or enough nuclear material to develop a "dirty bomb."

This article attempts to expand further on the concept of chemical warfare by providing the reader some of the history of nuclear warfare, the different types of radiation, exposure to radiation, the effects of a nuclear detonation, the dirty bomb, the immediate response after exposure to radiation, and the available antidotes.

History of Nuclear Warfare

In 1945, the United States dropped two atomic bombs on Japan in an effort to bring World War II to an end. The two bombs were dropped on the cities of Hiroshima and Nagasaki. As a result of the bombings, an estimated 160,000 people were killed in Hiroshima and another 80,000 in Nagasaki. The majority were killed by the explosion, and the remainder died from burns or being hit by debris. The war was brought to an end, but at the expense of many lives. These are the only two incidents of use of nuclear weapons currently recorded in history.

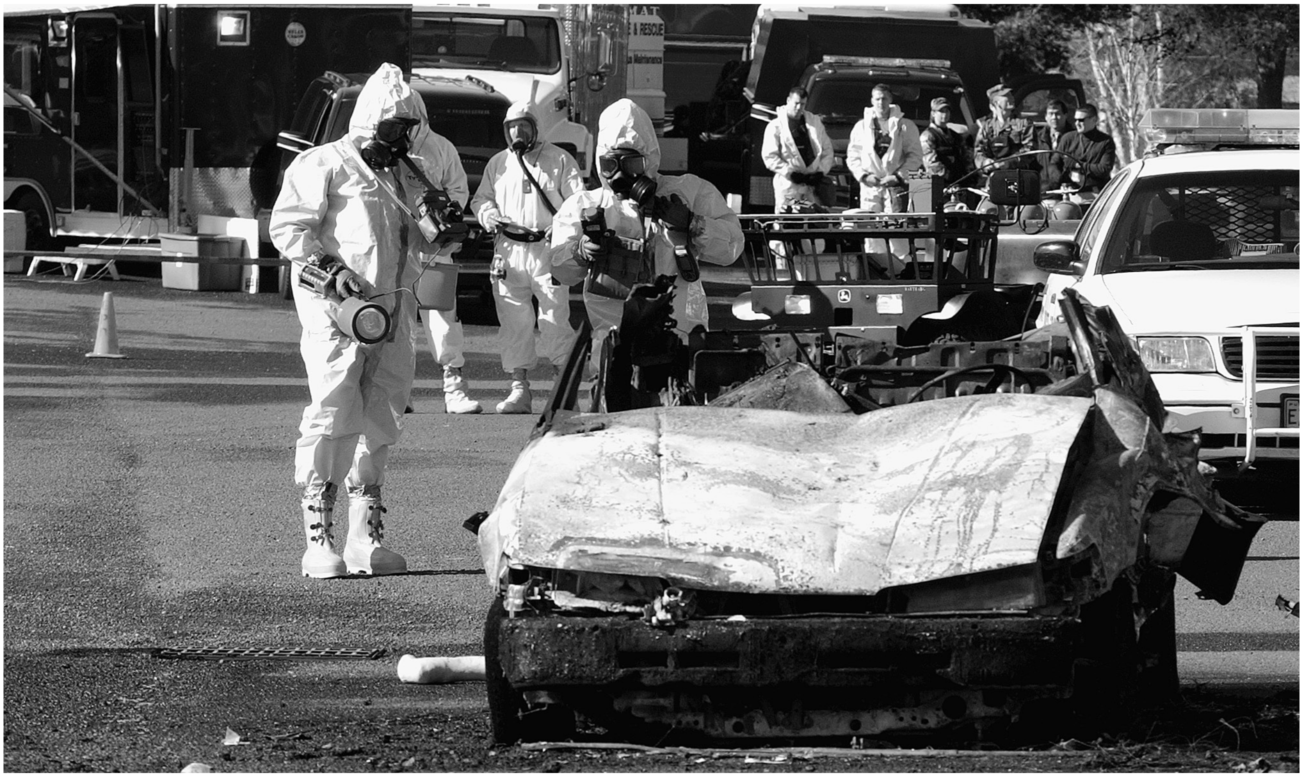
The United States thought this would deter the Soviet Union from expanding its influence in Europe. However, in 1949, the Soviet Union tested its first nuclear weapon, which ultimately triggered the start of the Cold War. Since then, at least seven other countries have developed some type of nuclear capability.

Different Types of Radiation

Before discussing the effects of a nuclear detonation or radiological device, it is important to understand the principles of radiation. There are two categories of radiation: non-ionizing and ionizing.

Non-ionizing radiation is low energy and mostly harmless. Examples include light waves, radio waves, and microwaves.

Ionizing radiation produces energy that is harmful to humans. Sources of ionizing radiation include natural radiation from the Earth and space,



Members of the Oregon National Guard's 102nd Civil Support Team approach a mock crash scene, ready to take readings and assess levels of contamination by a "dirty bomb" at a joint-agency exercise held on February 15, 2006, at the Portland Fire Department's training facility in north Portland. Even though the threat of nuclear warfare is a possibility, of greatest concern is the fact that terrorist interests could acquire a nuclear weapon or enough nuclear material to develop a "dirty bomb."

nuclear reactor accidents, radioactive materials used in industry and medicine, and dirty bombs. Ionizing radiation consists of three different types: alpha particles, beta particles, and gamma rays. They have the following characteristics:

- *Alpha particles:*
  - Heaviest of all ionizing radiation
  - Most highly charged
  - Travel more than seven inches in the air
  - Stopped by paper
  - Stopped by outer layer of skin
- *Beta particles:*
  - Smaller and travel faster than alpha
  - Have a lesser charge than alpha
  - Penetrate further into material or human tissue, but not into vital organs
  - Stopped by aluminum
  - Internal hazard if ingested
- *Gamma rays:*
  - Similar to X-rays
  - Transmitted through space in waves
  - Can travel distances up to 1 mile
  - Can penetrate all tissues and organs, causing damage
  - Two and a half inches of concrete or five inches of water will stop 50 percent of gamma rays
- *Neutrons:*
  - Uncharged particles
  - Emitted during nuclear detonation
  - Cause up to 20 times the damage to tissue as gamma rays

Exposure to Radiation

There are additional factors in determining the potential damage from the radiation: type and amount, time of exposure, distance from source, type and amount of shielding, and continuous or intermittent exposure.

Effects of a Nuclear Detonation

There are a number of possible effects of a nuclear detonation that could have an impact on both the environment and people:

- The primary effect of the explosion is the blast, which could cause light to severe damage of structures and critical infrastructure
- Blast injuries could result from the high-velocity winds, crushing injuries from collapsing buildings, or flying debris
- Thermal radiation may cause burns and ignite flammable materials
- Thermal injuries could include flash burns of the skin
- Eye injuries could result from the thermal flash
- Exposure to radiation from fallout
- Electromagnetic pulse results in damage to electronic equipment and electrical systems, causing disruption of the following:
  - Electrical infrastructure by disrupting the power grid
  - Telecommunications by disrupting communication lines, wireless, satellite, and radio
  - The economy by disrupting electronic financial transactions
  - Fuel and energy infrastructure by disrupting electronic control systems
  - Transportation by disrupting traffic lights and preventing vehicles from operating
  - Food infrastructure by disrupting food distribution
  - Water supply by disrupting pumping and filtration systems
  - Emergency services by disrupting vehicle operation and communications equipment
  - Space systems by disrupting low-orbiting satellites
  - Government
- Psychological effects of exposure to radiation could include panic, shock, depression, anxiety, and sleep disorders

Dirty Bomb

A dirty bomb consists of some type of radioactive material attached to a conventional explosive like dynamite. When the dirty bomb is detonated, there is immediate damage caused by the explosive, and the radioactive material is dispersed into the immediate area. A nuclear bomb is different from a dirty bomb in that it is more powerful than the conventional explosive. The nuclear bomb disperses radioactive dust in the mushroom cloud over a large area, resulting in fallout. A dirty bomb would be used to contaminate a facility and cause fear in its intended population. Most of the injuries from a dirty bomb would be from heat, flying debris, radiological dust, and the force of the explosive. Very little radiation is dispersed by a dirty bomb.

Radiation Exposure: Immediate Response

There are three things to do after being exposed to radiation: (1) evacuate the immediate area of the explosion, (2) remove contaminated clothing, and (3) decontaminate by washing with copious amounts of soap and water. There are two primary antidotes for treatment of exposure to radiation: (1) Prussian blue, which is effective for exposure to the radioactive element cesium-137, and (2) potassium iodide, which is administered for exposure to the radioactive element iodine-131.

Conclusion

This has been a brief overview of nuclear/radiological weapons, including the history of nuclear warfare, the different types of radiation, exposure to radiation, the effects of a nuclear detonation, the dirty bomb, the immediate response after exposure to radiation, and the available antidotes. This information provides only the baseline for understanding nuclear/radiological weapons and warfare. The threat of a dirty bomb is probably greater than that of a nuclear weapon. However, it is important to understand the principles of both to effectively respond to a nuclear or radiological incident.

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See Also: Department of Homeland Security (DHS); Federal Emergency Management Agency (FEMA); Health and Medical Response Scenarios; National Response Framework; Terrorism.

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Nuclear Proliferation

Nuclear proliferation refers to the spread of nuclear weapons, material (such as fissile material), and technology among nations or organizations. In order to explore possible solutions to nuclear proliferation, an adequate review of the characteristics and evolution of nuclear proliferation and the current status regarding nuclear disarmaments is warranted. There have also been recent research developments regarding mitigating small-scale and localized nuclear proliferation.

Motivation and Characteristics

There are three main motivations behind nuclear proliferation. First, some nations might invest in the construction of nuclear weapons to improve national security; second, some nations might perceive nuclear weapons as political tools to win certain domestic benefits; and third, other nations might construe nuclear weapons as a critical normative symbol of a nation's position and identity in the global community. In general, there are mainly two types of nuclear proliferation: (1) governmental proliferation, which includes both vertical proliferation, referring to the advance of the number and power of nuclear weapons by nuclear weapon nations, and horizontal proliferation, referring to the possession of nuclear weapons by formerly non-nuclear weapon nations, and (2) nongovernment proliferation, which refers to the procurement of nuclear weapons by adversarial groups such as terrorists and criminals.

Nuclear Proliferation Among Nations

Governmental nuclear proliferation frequently takes the form of arms races. If a nation possesses nuclear weapons, other nations within the region might feel insecure and rely on developing more nuclear weapons than their neighbors. Therefore, a vicious cycle could form and pose enormous threats to the whole world.

With realization of the potentially catastrophic effects of nuclear weapons, several treaties and agreements were made in the attempt to reduce the number of existing nuclear weapons while preventing new nuclear weapons from being built. However, credibility is an issue affecting their effectiveness. For instance, North Korea was secretly developing nuclear weapons although it had signed the nonproliferation treaty (NPT) in 1985. Its declaration of intention to withdraw from the NPT might result in unconstrained nuclear weapons production. Frequent nuclear inspections and accompanying diplomatic means are necessary to deter signatories from deviating.

Nongovernmental Organizations

The treaties and agreements probably will not have a constraining effect on terrorists' acquisition of nuclear weapons. In 1998, Al Qaeda leader Osama bin Laden stated that the acquisition of weapons of mass destruction (WMDs) is a "religious duty" for Muslims. These types of declarations are indeed alarming. Some alternatives to fighting terrorists directly might play a larger role in risk mitigation of nuclear weapons. Given the close connections among different nations, some nations might rely on other nations for countering terrorism rather than fighting directly. For instance, subsidizing another government that can interfere with terrorist activities, including nuclear proliferation, has been explored by X. Shan and J. Zhuang as a feasible alternative to passively preparing for nuclear attacks. A similar concept of contract might be another feasible alternative to reduce terrorist incidents. One particular mitigation method is interdicting a nuclear weapon production project using diplomatic, economic, and military means.

The smuggling of nuclear weapons across borders facilitates the spread of nuclear materials, which could be prohibited by inspection and retaliation declaration. However, too much unnecessary inspection would affect normal trade between nations, and limited resources prohibit a thorough examination of every container. N. Haphuriwat et al. rigorously investigated the possibility of deterring the smuggling attempt by container shipments across borders. Later, Shan and Zhuang studied the scenario, where the retaliation threat might not be credible.

Nuclear Proliferation and Crisis Management

Crisis management generally refers to means of managing exceptional events by mitigation, preparation, response, and recovery. Nuclear proliferation presents a great risk to society, and crisis management takes this nuclear risk into account. Nuclear proliferation also poses a significant threat to international security, has a huge impact on the international system, and accounts for many important cases of international crises. For example, the recent nuclear crisis at the Fukushima Daiichi power plant in Japan is reported to have resulted from "man-made errors." Therefore, regardless of the cause (intentional or unintentional), a necessary management plan must be in place to mitigate and prepare for such a nuclear crisis. The above-mentioned research on preventing nuclear proliferation would be considered as mitigation. Because of the devastating effects of nuclear disasters, emphasis on mitigation is necessary and critical.

After recognizing the catastrophic effects of detonated nuclear weapons, many nations rely on treaties and agreements to constrain nuclear proliferation and encourage nuclear disarmament. Frequent nuclear inspections, together with diplomatic methods, are needed to ensure their effectiveness. Governments can use subsidizing another government (which can interfere with terrorism), contracting with terrorist groups, interdicting nuclear production projects, and tightening border security to restrain nongovernmental nuclear proliferation.

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See Also: Interstate War; Nuclear and Radiological Weapons; Nuclear Risk; Terrorism; Weapons Trafficking.

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Nuclear Risk

The early 21st century is a time and age when the risks of catastrophic nuclear disasters are high. They can be caused by human error, equipment failures, sabotage, terrorist activities, war, and, in some cases, natural disasters. The risk of nuclear accidents or disasters can be considered to be relatively high; although the probability of occurrence is very low, the severity of consequence when they occur is very high. Several nuclear accidents are recorded annually around the globe. It is often a thin line between being minor accidents or catastrophic nuclear disasters. Table 1 shows some of the serious nuclear accidents that have occurred around the globe since 1952 and the International Nuclear Event Scale (INES).

Although the majority of the nuclear risks come from nuclear power plants as the world seeks non–fossil fuel sources of energy, there are other potential risks from sabotage and coordinated terrorist attacks. Nuclear risk comes from contamination of the environment from radioactive discharges or exposure to radiation, often the result of nuclear accidents. The risk to human populations as a result of radiation from nuclear accidents or disasters can occur in two ways.

The first is by contamination when fluids containing dangerous radioactive materials enter the body through injection or inhalation (referred to as internal contamination) or by direct contact with the skin (external contamination). The former constitutes a much higher risk to public health. The second risk is radiation. Radiation is invisible, odorless, and tasteless and can only be detected by specialized equipment. In this case, radiation from a source contaminates humans without any direct physical contact with the radioactive substance.

Health Effects of Radiation

Cancer is the primary health effect of long-term chronic exposure to radiation. Some previous nuclear accidents like the Chernobyl nuclear disaster have linked radiation exposure to breast cancer, lung cancer, and leukemia. Radiation exposure can also cause damage to human DNA. Acute exposure can cause burns and radiation sickness (also referred to as radiation poisoning). The symptoms include skin burns, nausea, headache, hair loss, and loss of white blood cells. Radiation can also affect the effective functioning of certain organs of the body, with children particularly more sensitive to the effects of radiation. There is also the psychological burden and mental health effects on the population, often made worse by lack of information or poor communication to the public about the health risks of exposure to radiation. There is currently no effective medical treatment for very high radiation exposure. The effects of lower exposure may be treated using various intrusive treatment methods, including bone marrow transplant and blood transfusion.

Managing Nuclear Crisis

During nuclear crisis, it is the immediate responsibility of the operator, in the case of a power plant, to get the events under control at the technical level. The local, regional, or national authorities have a responsibility to protect the environment and the public health of the population.

To prevent internal contamination, measures should be taken to protect drinking water and food sources, as radioactive materials can end up in both food and drinking water sources. Where radioactive iodine is released during nuclear discharges, doses of iodine tablets can be made available by the relevant authorities. Taking recommended doses of iodine tablets helps saturate the thyroid gland with nonradioactive iodine and hence prevent the adsorption of radioactive iodine, which can enter the body through the airways or contaminated food and water. Iodine tablets should only be taken based on the recommendation of the relevant authorities. They should not be taken based on individual initiatives. Adults over the age of 40 should seek medical advice from their doctors on the use of iodine tablets. Unless there are very high doses of radioactive iodine released, older people should avoid the use of the tablets.

To reduce both internal and external contamination from radioactive discharges, people

Table 1 Serious nuclear accidents since 1952 with International Nuclear Event Scale (INES)

Name	Year	Country	Event	INES level
Chalk River experimental reactor	December 1952	Canada	Core damage	–
Mayak nuclear complex	September 1957	Soviet Union	Storage tank explosion with 200 deaths and more than 270,000 people exposed to dangerous rations	6
Windscale nuclear reactor	October 1957	United Kingdom	Fire in graphite-core reactor with 33 deaths	5
Idaho Falls	January 1961	United States	Reactor explosion with three deaths	–
Bohunice nuclear plant	January 1976	Slovakia	Release of radioactive carbon dioxide with two deaths	–
Three Mile Island power plant	March 1979	United States	Partial meltdown of one reactor	5
Tsuruga nuclear power plant	March 1981	Japan	Over 100 workers' exposure to very higher radiation with release of radioactive substance to the Sea of Japan	2
Buenos Aires	September 1983	Argentina	Worker error led to fatal exposure with additional 17 workers being exposed	5
Chernobyl power plant	April 1986	Soviet Union	Reactor explosion with thousands of deaths both directly from the accident and from long-term radiation exposure	7
Goiania	September 1987	Brazil	Stolen radiotherapy source led to four deaths and contamination of about 245 people	–
Severesk	April 1993	Russia	Uranium plutonium factory explosion with contamination of 120 square kilometers	4
Tokaimura nuclear processing plant	September 1999	Japan	Worker error in eventually resulting two deaths and about 40 serious radiation exposures	4
Mihama power plant	August 2005	Japan	Steam and hot water leak from broken pipe; five deaths and seven injuries	1
Fukushima Daiichi power plant	March 2011	Japan	Triggered by earthquake and tsunami, with four reactors damaged	7
Macoule nuclear site	March 2011	France	Furnace explosion with one death and four serious injuries	–

should be advised to stay indoors, with windows and doors shut. In serious cases, authorities may have to evacuate the population away from close proximity to the main sources of the radiation. The public should be advised to remain calm. During evacuation, they should shut off gas, electricity, and water before leaving their homes. Also a good practice by authorities is to set up relief centers for affected people for medical checkups and decontamination. All practical information needed should be made available to the public.

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See Also: Chemical Risk; Emergency Public Information; Nuclear and Radiological Weapons; Nuclear Proliferation.

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Office for the Coordination of Humanitarian Affairs (OCHA), UN

The United Nations (UN) Office for the Coordination of Humanitarian Affairs (OCHA) is responsible for coordinating a response to emergencies by providing a framework within which humanitarian organizations can contribute to the response effort. The mission of the office is to coordinate an effective humanitarian response by partnering with national and international actors in order to alleviate human suffering in disasters, advocate the rights of those in need, promote preparedness and prevention, and facilitate sustainable solutions.

History of OCHA

In order to strengthen the response to emergencies and disasters and improve the effectiveness of humanitarian operations, the UN General Assembly adopted Resolution 46/182 in December 1991. This resolution created the new position of emergency relief coordinator (ERC), with the purpose of combining the functions previously carried out by the Secretary-General's representatives for major and complex emergencies and the UN Disaster Relief Organization. Also created by Resolution 46/182 was the Inter-Agency Standing Committee (IASC), which ensures inter-agency decision making in response to complex emergencies.

The Department of Humanitarian Affairs (DHA) was established soon after the adoption of Resolution 46/182. The DHA was reorganized in 1988 into the OCHA, with an expanded mandate that includes coordinating humanitarian response, policy development, and humanitarian advocacy.

The OCHA's coordination function is carried out mainly through the IASC. All humanitarian partners that may respond to a disaster are participants on the IASC. These may include the Red Cross, nongovernmental organizations (NGOs), UN agencies, and any other partners with an interest in the response. The types of response carried out by the IASC are needs assessments, consolidated appears, field coordination, and the development of humanitarian policies.

The Secretary-General introduced a series of humanitarian reforms in 2005 to ensure greater predictability, accountability, and partnership in the international humanitarian response system. In 2009, the General Assembly declared World Humanitarian Day as a means to increase public understanding of humanitarian assistance activities. World Humanitarian Day is celebrated on August 19 each year.

OCHA Funding

OCHA's coordination work is funded mainly from voluntary contributions from UN member states and the European Commission. The office also receives private donations and a small percentage of the UN Regular Budget. The Regular Budget is approved every two years and is funded from contributions paid by each member state. OCHA received only 0.6 percent of the Regular Budget for 2010–11, totaling $14 million per year. OCHA's budget has quadrupled since 2002, although the amount it receives from the Regular Budget allocation has remained nearly the same.

Response

Through its 24 regional offices, OCHA can quickly respond to a new or escalating crisis. Response to emergencies can come from a variety of organizations that OCHA helps coordinate, such as the Red Cross, United Nations offices, international and local nongovernmental organizations, and governments. OCHA attempts to build consensus among organizations regarding the response priorities and how to accomplish those goals in order to ensure an effective response and to avoid duplication of effort.

OCHA manages the UN Disaster Assessment and Coordination (UNDAC) system, which is a team of emergency managers on standby and ready to deploy within 24–48 hours of a natural disaster. Members of the UNDAC come from more than 60 countries, NGOs, and other agencies. OCHA can also send response coordination specialists to a scene within hours.

OCHA in Action

OCHA channels funds to international and national humanitarian partners. OCHA manages a Common Humanitarian Fund (CHF) that has provided nearly $900 million to Sudan since 2006, and it allocated $155 million to 289 humanitarian projects in Sudan and South Sudan in 2011 alone. One project funded by the CHF was a $200,000 overhaul of the water system at the Dereige camp for internally displaced persons in Sudan that houses more than 25,000 people. The project, managed by Mercy Corps Scotland, an international NGO, connected new water tanks in the camp to boreholes four kilometers away. By doing so, people are now able to receive nearly 15 liters of drinking water per day at water points in the camp. Before the project, women needed to walk more than 10 kilometers to get drinkable water.

OCHA is also using current technology to gather information and to help plan responses to emerging situations. When events in Libya began to unfold in February 2011, OCHA activated a group of more than 150 online volunteers to help create an online map that tracked information relevant to relief efforts in real time, such as security issues, health needs, and refugee movements. Organizations such as the Red Cross, the U.S. Agency for International Development (USAID), the World Food Programme, and others used the site to assist in planning their response efforts.

Future Planning

OCHA planned to have a presence in more than 50 countries in 2012, with the largest operations being in areas with long-standing issues, such as Afghanistan, Democratic Republic of Congo, Somalia, the occupied Palestinian territory, South Sudan, and Sudan. OCHA will continue to respond to crises as they occur and is ready to increase its presence in areas when needed.

OCHA is also focusing on partnering with a wider range of organizations. It plans to continue building and strengthening relationships with governments, response agencies, private companies, and various experts around the globe, including the signing of a memorandum of understanding with the Organization of Islamic Cooperation. OCHA is working to expand and create new partnerships with the African Union and will open a new office in Abu Dhabi.

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See Also: Bureau for Crisis Prevention and Recovery, UN (UNDP–BCPR); International Strategy for Disaster Reduction, UN (UNISDR); Nongovernmental Organizations; Red Cross and Red Crescent.

Further Readings

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Operational Plans

General Dwight D. Eisenhower once remarked, "In preparing for battle I have always found that plans are useless, but planning is indispensable." His observation is equally valid for civil emergencies. The point is that the provisions stated in written plans will always have to be adapted to the specific circumstances of a particular emergency, but the process of planning is important because it induces the planner to consider the elements and dynamics of emergencies and the choices among possible response strategies.

Planning to conduct and manage relief operations for civil contingencies, emergencies, and disasters is a complex process but one that could be characterized as "organized common sense." Its main aim is to integrate emergency resources and ensure that they are used in the most practical and efficient way to solve the problems created by the emergency (for example, search and rescue, provision of medical care and shelter, damage limitation, and the maintenance of public safety).

Several elements are present in the emergency environment. One consists of the permanent emergency plans that different organizations and levels of government require. Another is the contingency planning that adapts the provisions of the permanent plan to the evolving reality of the emergency situation. In this context, one should distinguish between plans and procedures. Operational planning should not be designed to specify in detail the procedures to be used. For instance, the plan should not instruct police officers how to direct traffic or tell firefighters how to extinguish a blaze. It should instead explain how to use standard operating procedures in concert among many organizations during unusual and probably extreme circumstances. Hence, the plan is rather like the score of a symphony. Individual players have their own music (the procedures), but the overall effect must be one of harmony by synchronizing highly compatible contributions (the plan).

Planning is the opposite of improvisation. However, in reality the two concepts are not quite so antagonistic. Contingency planning conducted in the period before an emergency (when lead times and alerts are sufficient) is supplemented by short-term strategic and tactical planning during the emergency, which serves to adapt operations to the dynamic needs generated by the impact (Figure 1). This is a form of "bounded improvisation." Nonetheless, although pure improvisation cannot be eliminated from the emergency response, largely because every crisis involves some unique elements, it should be reduced to a minimum. Failure to anticipate needs that can be foreseen in advance is tantamount to negligence. Hence, in large measure, improvisation can be equated with inefficiency, and inefficiency adds up to impacts that could be reduced or avoided. In synthesis, plans should regulate the use of procedures, including the standard operating procedures of particular organizations, and protocols, the "rules of engagement" to be adopted under particular circumstances.

Emergency and operational planning are part of a hierarchy in the decision-making and organizational system known as civil protection or civil defense. At the top level, policies define the broad objectives of the system and are concerned

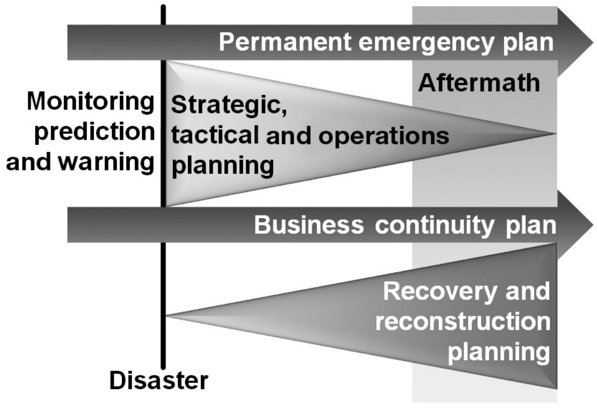
Permanent emergency plan
Aftermath
Monitoring prediction and warning
Strategic, tactical and operations planning
Business continuity plan
Recovery and reconstruction planning
Disaster

Figure 1 Interaction between types of plans during the aftermath of a disaster

with the prevention of casualties, the limitation of damage, and the avoidance or reduction of interruptions to normal activities. By identifying concrete actions to be taken, strategic planning aims to connect policies with the means of making them operational. Strategic planners concentrate on finding the resources to be used in foreseeable emergency situations. Tactical planners concentrate on how to distribute those resources to best effect. Operational planners try to look ahead of ongoing operations in order to ensure that the most efficient use is made of the available resources as these arrive at the scene. This is a supply-and-demand problem: when the crisis begins, there is a large, unfulfilled demand for resources (to save lives, evacuate people who are at risk, provide shelter and meals, and all the typical actions of emergency first responders), but the gradual accumulation of resources in the area redresses the balance in favor of supply. The speed, accuracy, and efficiency with which this occurs is a function of the quality of both prior and ongoing planning and management. In synthesis, one role of operational planning is to regulate the "convergence reaction" that usually occurs when emergency resources are sent to the scene of an incident or disaster.

Bridging the Gap

In a major emergency such as a large disaster, more than 100 agencies may be present at the scene or may be working elsewhere to provide resources for the local response. Therefore, planning has to specify how these various agencies work together: It does so by dividing tasks and competencies and stating the modes of interaction and collaboration, as well as the system of direction or command. One can assume either that the agencies do not normally work together or—more likely—that they do not normally do so in the manner required by the emergency. The degree to which members of the organizations have familiarized themselves with the plan and exercised together may determine the success or failure of real emergency operations.

Planning for major event management involves devising procedures for dealing with civil contingencies in the context of disaster risk reduction and the promotion of resilience. The field is divided into three sectors: civil protection involves "bottom-up" (i.e., locally organized and nationally coordinated) responses to general emergencies; civil defense involves national organized (i.e., top-down) responses to security threats; and business continuity management is designed to ensure that normal business practices in the private and public sectors are maintained or restored quickly in a crisis. Regarding civil contingencies of all kinds, operational planning has to achieve the difficult goal of integrating different types of organizations, and at a level that optimizes their ability to work together. This is the problem of interoperability: it involves the need for compatibility of equipment, procedures, protocols, and working practices. Planning needs to bridge the operational gap between various types of organization, as follows:

- *Geographical:* for example, contiguous jurisdictions
- *Sectoral:* public administration, private companies in charge of key functions, and civil society organization (especially in the voluntary sector)
- *Hierarchical:* local, regional (for example, county, state, province, department), and national
- *Functional sectors:* health care, public works, economy and employment, public security, utilities, and lifelines
- *Organizational:* for example, police, fire, ambulance, specialist rescue.

The planning process must find the most appropriate scale of interaction between these various organizations, constituencies, competencies, and jurisdictions. Furthermore, plans must maintain compatibility between levels of government (local, regional, and national) and sectors (e.g., municipal, airport, health sector, industrial plants, commercial facilities, and cultural heritage protection; Figure 2).

Mutual assistance pacts can be used to strengthen disaster response in conditions where it is expected that local resources will be insufficient or overwhelmed. These can be either bilateral or multilateral agreements. One problem with mutual assistance agreements is that no organization will want to commit its own resources if it is likely to remain uncovered, either operationally or financially. In this respect, multilateral agreements are

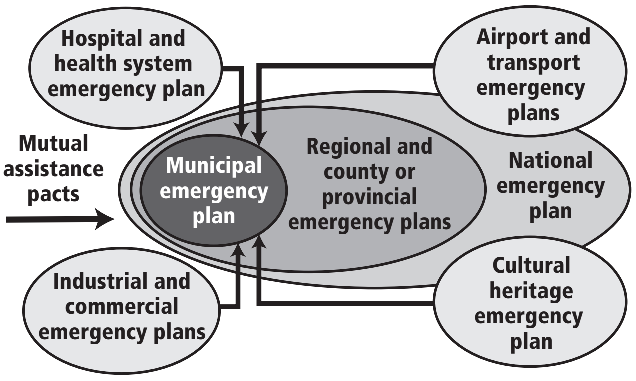
Hospital and health system emergency plan
Airport and transport emergency plans
Mutual assistance pacts
Municipal emergency plan
Regional and county or provincial emergency plans
National emergency plan
Industrial and commercial emergency plans
Cultural heritage emergency plan

Figure 2 Nesting among plans of different types and at different levels

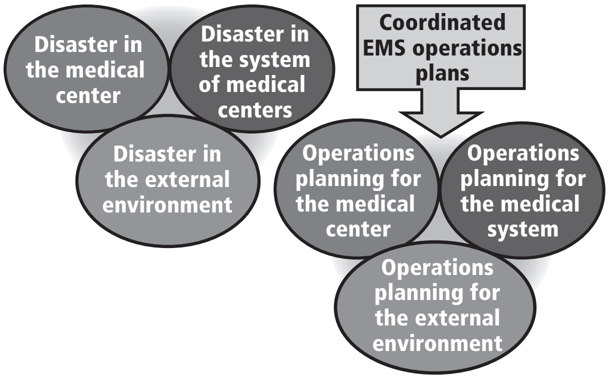
Disaster in the medical center
Disaster in the system of medical centers
Coordinated EMS operations plans
Disaster in the external environment
Operations planning for the medical center
Operations planning for the medical system
Operations planning for the external environment

Figure 3 Planning for contingencies in the health system and hospitals

a better way of pooling resources, but they tend to be complex and require more effort to be concluded and implemented. Mutual assistance pacts must specify which resources will be supplied and under what conditions and who will pay for them. Once these details are agreed, they can be incorporated into each party's operational plan.

Health response to emergencies is one sector in which operational planning is very important. When making provisions for mass-casualty incidents, it has been found to be as important to have plans for the wider health system as to have them for individual medical centers (Figure 3). Hospital emergency plans must face up to both internal and external contingencies. The former include fires and contamination episodes at the site, while the latter refer to large influxes of patients from incidents and disasters that take place outside the hospital. Medical system plans need to respond to contingencies such as disease surveillance, emergency medical response, and coordination of area health responses. In major incidents, interchange between hospitals (especially level 1 trauma centers) is necessary in order to maximize the ability to diagnose and treat patients. This requires planning of logistics and information flows. Moreover, the health response to incidents and disasters must interact with other emergency planning systems, such as those applying to search and rescue, and evacuation of people at risk.

The Planning Process

There are five steps to the creation of an operational plan:

- Research involves carrying out an initial study and collecting data on local hazards, demography, vulnerabilities, and dynamic systems.
- Writing involves creating the plan, along with any appendices and annexes containing data and descriptions of procedures.
- Publicity is the means by which the plan is made known to all participants.
- Operations test the plan with field exercises, simulations, and scenario investigations.
- Updating involves revising the plan periodically and ensuring that the new version is adequately known to the users.

This process is similar in many respects to urban planning, and indeed it embodies a geographic component of similar scope and importance.

Several other requisites are worth mentioning. Plans need to be written in clear, unambiguous language, as equivocality can be dangerous when it applies to emergency operations, or it can at least promote inefficiency. Plans need to be compatible with legislation in several fields: first, emergency management, and then environmental protection, or health and safety at work. To ensure compatibility, it is usually sufficient to make a comparative reading of the legal instruments and the plan in order to identify any provisions in the plan that might clash with the statutes. One hopes that there is no ambiguity or contrast among the laws, which is, unfortunately, not something that one can always depend upon. Next, plans should consider some easily neglected needs associated with emergencies, such as veterinary management, the care of prisoners, and cultural heritage protection. Emphasis on the processes involved in devising plans, rather than the end product, should help stimulate the search for such unexpected consequences that must be managed in a crisis. Finally, plans need to be written in a manner that is clear, concise, and comprehensive. Although this may seem to involve contradictions, the solution is to relegate details to appendices, and at the other end of the scale, provide summary charts as an aide-mémoire. The body of the plan should be specified sufficiently clearly for readers to be able to see the overall architecture and concept of operations without the encumbrance of excessive detail. In all cases, the primary objective of planning is to save lives and protect people, while the second objective is to limit and contain damage.

Operations in a crisis situation can usually be envisaged and modeled before the event happens. The scenario approach should be used wherever sufficient information is available on which to base a forecast of the evolution of a future crisis. In this context, a scenario is not a full-scale prediction of the future, but is instead a means of using past experience to explore possible future developments. There will be a range, or tolerance band, of possible outcomes. For instance, the human impact of earthquakes is heavily influenced by aggregate patterns of human behavior, in terms of where concentrations of people are to be found at particular times of the day, and the relationship between aggregate patterns of human activity and patterns of damage. Hence, seismic disaster scenarios will vary by time of day and day of the week. Traveling (including commuting); working in offices, shops, or factories; studying at school; resting or sleeping at home; and frequenting other locales are all activities that change the pattern of risk and the resulting need for emergency intervention. Nevertheless, multiple scenarios can be used, and they can be based not merely on hazard, vulnerability, and impact but also on the design of possible responses to meet special needs generated by the predicted impact.

Where the consequences of future events are not adequately known, and also for rare forms of impact, plans need to be based on generic procedures rather than responding to the detailed requisites highlighted by scenario modeling. This is the difference between ignorance, uncertainty (partial ignorance), and probability (Figure 4). Levels of uncertainty are increased by specific problems that planning must tackle. For example, "fat-tailed" (i.e., skewed or asymmetric) distributions involve relationships between hazard and vulnerability that give more weight to large, infrequent events than a balanced (Gaussian) distribution would predict. Hitherto, the magnitude–frequency relationships on which natural hazards modeling and emergency planning have been based place much emphasis on medium-sized events in which the low likelihood of very large contingencies is balanced by vulnerability that rises with the size of event. Current thinking gives more weight to larger events that are less expected. The dilemma here is that it makes no logical sense to produce detailed plans that determine how to react to events that have a very low probability of materializing during the life of the plan. Nevertheless, extreme events enhanced by climate change and the rising complexity of disaster impacts are both promoting a new view in which major events are not considered so unlikely, and there is thus some incentive to take them into account, even if the resources are simply not available to deal with them effectively.

The dilemma of uncertainty versus probability is compounded by the need to consider interactions between risks, secondary disasters, collateral

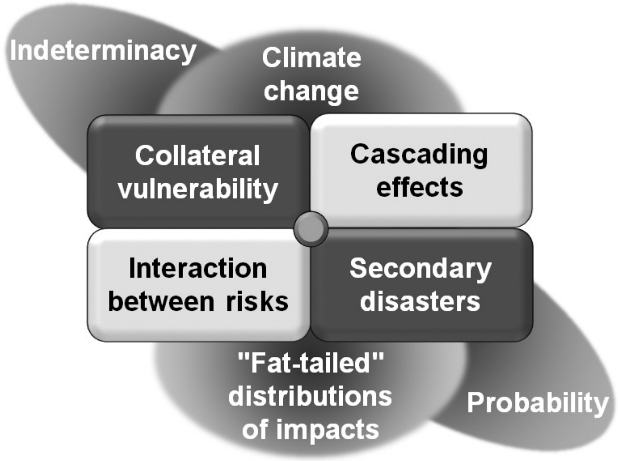

Figure 4 Various complications to the process of operational planning

vulnerability, and cascading events. The Japanese earthquake, tsunami, and nuclear radiation release of March 11, 2011, emphasized the importance of taking these connections into account wherever possible. The tsunami had a more profound impact than the earthquake that triggered it, and in the end it may be found that the nuclear contamination has a more enduring effect than the tsunami. Hence, the secondary effects can overshadow the primary ones or the triggering event. Moreover, planning should tackle emerging risks as well as workaday contingencies and major incident and disaster risks. For example, if pandemic influenza reached levels comparable with the outbreak of 1918–19, which is perfectly possible in a future scenario, then many of the most profound effects would be socioeconomic rather than medical. Whether the result of illness or fear of contamination, absenteeism would affect the staffing of basic services. Patterns of consumption and public association would undergo radical mutations, which would greatly affect economic activities and put immense strains on welfare facilities. It is possible to make contingency plans to deal with such eventualities, and most of the ramifications of pandemic impacts can be foreseen and modeled by scenario techniques. However, planning for such cases requires vision and ingenuity. It also requires the commitment of resources, which governments are rarely willing to concede, as they tend to view the likelihood of a catastrophic pandemic as extremely low.

Whatever the type and scale of an emergency, the fundamental components of the operations plan are resources, consisting of personnel and manpower; materials, consumable supplies, and fuel; buildings; vehicles; equipment; and communications. To these should be added structures and organizations, networks, and the assignment of tasks. These ingredients need to be connected together by formally articulating relationships among participating organizations and by specifying command structures, communications channels, and the operating procedures that enable these to function in crisis situations. For example, the process of evacuation is one of the best means of preserving human life in the face of major hazard impacts, providing there is sufficient lead time and there are the means to accomplish it. Evacuation therefore requires the ability to detect a threat and warn the evacuee population, ensure that its behavior will be compliant with instructions, utilize evacuation routes efficiently, and activate reception centers or otherwise disperse the evacuees to safe locations. Evacuation must also be maintained and serviced for the duration of the emergency phase. This will require the cooperation of various forces, including those that are responsible for monitoring, forecasting, and warning processes; those that deal with the logistics of the evacuation; and those that manage information flows.

Operational emergency planning has a natural home in an emergency operations center (EOC). This will probably be a bicameral structure, whose basis is an operations room (for communicating decisions and actions) and a somewhat quieter decision-making room, sometimes known as the conference or situation room. Many EOCs are larger, more complex structures that are multifunctional and may work around the clock. All EOCs require autonomy in the face of possible losses of basic utilities, such as electricity supplies and communications channels. The EOC will be connected to field command posts. In the equivalent health system arrangements, the ambulance dispatch center and medical response command center will be in direct communication with field triage and first aid posts (advanced medical posts). The plan should ensure that lines of command and collaboration are well established and that they function well between these “nerve centers” of the emergency response system.

Conclusion

The most efficient operations planning is generic and hence is designed to tackle all kinds of hazards. However, it may have special provisions for the most common and expected hazard impacts in the area of its jurisdiction. Whatever the administrative level at which a plan is pitched, it should aim to reinforce, not replace, local resources and to develop a state of local self-sufficiency. In a well-developed emergency response system, plans are the means by which disaster risk reduction is programmed and strategies are turned into real achievements. Once again, it is the process, rather than the end result, that matters most. Planning focuses attention on the need to anticipate the contingencies that will have to be dealt with when a real emergency happens. It reduces the need for improvisation, which is usually an inefficient and wasteful means of dealing with the demands of the emergency.

An operations plan should be an instrument designed to be applied to real problems whenever needed. It should be a guide to actions rather than an absolute determinant of them. It should foster initiative rather than stifling it. This may mean allowing sufficient space and leeway to improvise wherever this can "cut corners" and improve the efficiency of emergency responses. Moreover, it should be a living document that is constantly subject to change as the real circumstances in the field change. Creation of the plan should be a cooperative effort that involves much consultation with stakeholders. Dissemination should involve training in how to activate and use the plan. Tabletop, in camera, and field exercises can be designed to test different aspects of the plan in terms of whether they are efficient provisions for managing emergency situations. In the plan, all participants should be given roles to fulfill, and they should be aware of what they will be expected to do when the plan is activated. Conditions should be well specified for both the activation of the plan and the end-of-emergency stand-down procedure. The plan should also contain clear provisions for updating it and repeating the dissemination and testing processes.

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See Also: Business Continuity Planning; Business Resumption Planning; Contingency Planning; Incident Action Plans; Pre-Impact Planning Process; Scenario Planning; Strategic Plans.

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Operational Readiness

Operational readiness (OR) in the military is the capability of a unit or weapons system to carry out the mission for which it is intended. Sometimes it is referred to as combat readiness, and it may be either a general term or graduated by degrees. In some organizations, it is called operational acceptance testing (OAT). A related term is *production readiness*.

Military

Operational readiness in the world of military aircraft includes time in a simulator such as the P-3 with space for five crew members, The P-3 dates to the 1960s and is now out of production, and at $36 million it is an expensive asset to exercise in the real world, but it is a complex system with critical missions for which it must be operationally ready. Simulation is a more cost-effective option. The realistic training environment involves photo databases, communications links, target sensors, acoustic modeling, and, in general, total control of the training environment by the observer/instructor. It allows monitoring of problems and scenarios, crew displays, and replay/mission debrief. Rather than deploy in an expensive aircraft on an antisubmarine warfare or surveillance mission, the crew can remain at home and simulate contact, weapons firing, and communications back to unit headquarters.

Disaster Preparedness Activities

For disasters and emergencies, operational readiness is hard to sustain. OR depends on many components. It begins with having adequate policy and procedures established, but it also involves having a survivable and functional emergency operations center (EOC). An established EOC offers organizations benefits including on-the-job skilled people, ongoing training, and exercise capability. Most disaster preparedness organizations are located in areas where natural disasters or human-made ones are fairly frequent, say every couple of years over a 40-year stretch. Actual events train people in real-world actions, ensuring that they are operationally ready. In the gaps between real-world events, training and exercises are essential, whether through national agencies' courses or elsewhere.

Above all, OR depends on frequent and regular meetings of those who will staff the EOC in event of a disaster. Monthly meetings are opportunities to review policy and procedure, planning, and future events. Tabletop exercises can take place during some meetings, with EOC team members talking about how they would handle a given scenario, what information they would need, and what problems might arise. Also valuable are disaster exercises to the level of testing the readiness of two or more EOCs, with communications between the two as the exercise and Master Scenario Events List unfold.

If an exercise is realistic enough, participants actually feel pressure and emotion, and it is easy to detect who can handle stress and who has problems. Pre-announced exercises are better than surprise ones because participants brush up on jobs and the overall organizational mission. Frequent exercises help bring newcomers up to speed (there are always newcomers as old-timers retire or otherwise leave.) OR is an ongoing process, not a straight line but a bumpy upward progression if done right, or a mountain range with dangerous cliffs if neglected.

Software Development and Maintenance

Operational readiness is also a concern for software developers. It is often a subpractice of release. As skeptics note, without OR, what results is "dead cat" syndrome—dead cats tossed over the partition to operations from solutions. The effective way to ensure OR is to build it into all phases of software development, from architecture through design, build, test, release, and evaluate. OR is not a major investment of time or money but does require a degree of formalization and suffers from inattentiveness. Checklists, as always, are invaluable in ensuring OR, whether of software or another asset. Although it takes time to get OR into the entire life cycle, it does happen, with checklists "iteratively revisited" throughout the project. To work, it should be somewhat flexible. Iteration after iteration of the same process through change cycles for production items is cumbersome and undesirable; still, there needs to be some formal OR measurement of changes or the credibility of the initial OR documentation comes into question.

One comment is that OR or OAT occurs only in the project life cycle and not in change to services and products already in production. Project managers often see OAT as a bottleneck, something expendable when schedules slip and due dates loom. Those who create the product are sensitive about OR because testing operational readiness draws attention to deficiencies or shortcomings. Production items are rarely tested for OR because production change is too expensive.

Virtual Operational Readiness

Cloud computing is becoming more widespread, and information technology (IT) organizations have to adjust and develop the appropriate operational readiness. The technology is there for the most part. What is most likely to cause a failure are people and process. Cloud computing requires new practices and structures. Successful cloud computing requires changing organizational structure and processes. People have to change as well. It requires rethinking capacity management of abstracted and pooled resources. Provisioning is different when the customer has self-service, on demand capability. The cloud world is faster. People and processes have to be appropriate, faster, and streamlined, and that means change or a loss of operational readiness.

OR applies to the cloud as well as to the desktop. In both cases, the goal is to develop an application suitable for use by others. It has to be operationally ready. For virtual applications, there are 12 mandatory principles, a checklist that cannot have any missing checkmarks. Cloud companies provide the service—for a fee. Green Hat has tools for testing performance. Core Cloud Inspect evaluates security. Cloudkick monitors infrastructure. For a much larger fee, Novell and EMC will take care of the entire OR matter. For those on a tighter budget, the enterprise service provider has to evaluate the proposed application through these principles. Functional testing has to be signed off on. Then there has to be a check for adequate capacity for the specific task in mind, with flexibility, of course. Resiliency is also critical, with ability to compensate for points of failure or less than perfect code without undue embarrassment or inconvenience. The service has to be resilient, able to overcome operator error, carelessness, or incompetence. Reliability and scalability are important, as is security. The system also has to have been worked over beforehand to correct as many bottlenecks and other errors as possible. It also has to have integrity, so that customers can be sure their data are reliable, their files are available, and their data are secure. It also has to meet the terms of the service agreement. The customer has to be sure that performance is as specified. Automated measurement and reporting provide assurance and opportunity to revive a deficient service.

Software and Contractors

Fluor is in the business of making businesses operationally ready. Fluor incorporates technology to speed up implementation of new facilities and incorporates them into an existing business. Its system, named UpFRONT, manages commissioning, start-up, turnover, preparation of the organization and employees, and, in general, making sure that everything is done at the right time and finished on schedule. It even provides maintenance best practices to make the new asset less expensive to run and to extend the life cycle. The software is modular, allowing the owner to select only the parts deemed suitable, depending on the size and complexity of the facility.

Capacity planning entails siting and planning of new facilities. Life cycle design support helps ensure that facility design and procurement mesh with staffing, operations, and maintenance for maximized life cycle cost-effectiveness. Other software ensures readiness of systems, organization, support, supply, and maintenance. Readiness and risk assessments are included, as are commissioning and testing. Within the suite is operational readiness planning, which coordinates and develops the integrated master plan to ensure that all critical start-up activities are ready to run when the time comes. This is all in the UpFRONT operational readiness suite.

TPS is another operational readiness service provider. It seeks to make a smoother transition from the built system to its use by real customers. Its specialty is television. Operational analysis and workflow design reduce network downtime and possible overstaffing. TPS begins at the project's beginning and continues until the operators are trained, at the end of the project, in the product, signal flow, and maintenance.

At the beginning, during preliminary design, the OR team meets with systems integrators and engineers to discuss all the subsystems. At the same time, business stakeholders have an opportunity to express their expectations, and the OR process ensures incorporation of the business goals in the technology. Deficiencies may persist after these preliminaries, but the design phase is a second chance for economical adjustments and corrections. Technical solutions are developed with the operator in mind.

After establishing the general solutions, the next step is engineering design, with all potential processes formalized in workflows based on standard business processes. Visual workflows allow operators to see where their portion takes place and how it fits into the network group. Supporting the workflow visuals are training courses specific to the different job descriptions the project will require.

Computer and information security training are the specialty of SANS. Working in cooperation with the Center for Internet Security, SANS developed SCORE to work on best practices and benchmarks. SCORE emphasizes checklists for operational readiness. Among the topics are Ubuntu Linux, Windows 7, Firewalls, BSD, abd Web servers (Apache and IIS). Proposed checklists include Malicious File Investigation Procedures, malware analysis, malware analysis tools, virtual machines, Microsoft 7 security, OS X security, and more. Checklists are seen by security professionals in all areas as an integral part of operational readiness measurement, and the variety of available checklists is growing.

The 2012 London Olympics and Paralympics were other venues where operational readiness was not to be taken lightly, not to be taken for granted. The vendor was Atos, a worldwide IT company, and it had already completed the first of two planned technical rehearsals. Atos Business Technologists, LOCOG, and other technical vendors ran stringent tests of communications, media, IT, and security of the games and technology. The IT contract was the largest for any sports event ever, and testing ensured that Atos was ready for any contingency—that its operational readiness at a peak. The first test involved over 300 IT workers in simulations of game-related scenarios. ATOS claimed to have performed over 200,000 hours of testing of the London IT systems, expected to handle 30 percent more information than any previous Games. The company touted the success of the first test. The real-event effort was expected to involve 900 servers, 1,000 security and network devices, 10,000 computers, and 3,500 IT personnel. A second test was due in May 2012.

Conclusion

OR is not only a military term. It applies to all organizations that expect to remain competitive and effective in performing their mission, satisfying their clients or customers, and doing the right thing on time and in the right way. It is no longer a simple do-it-yourself function, but there are firms ready and willing to support or actually implement OR—if the price is right.

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See Also: Contingency Planning; Disaster Recovery Plan Test Cycle; Exercises; Operational Plans; Preparedness; Training.

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Organizational Failure

Organizational failure generally refers to the inability to achieve organizational goals or predetermined performance criteria. An organization is a complex system that relies on the relationships within the organization and in its environment. The interaction between organizational and environmental factors is most likely to contribute to organizational failure.

Organizational failure is characterized by negative indicators such as resource reduction, severe profit loss, loss of legitimacy, loss of market share, or exit from market. Characteristics of failure in private and public sectors differ from each other.

Case Study: Organizational Failure During Hurricane Katrina

Hurricane Katrina collided with the Gulf Coast in August 2005 and was one of the strongest and deadliest hurricanes in the history of the United States. Katrina's wind speed reached 125 miles per hour and destroyed roads, buildings, and other infrastructures. More than 1,800 people died during the hurricane and aftermath floods.

Because the effect of Katrina spanned millions of people across a very large area, the scope of the disaster was difficult to manage. Government response to Hurricane Katrina by agencies such as the Federal Emergency Management Agency (FEMA) was criticized for poor preparedness, lack of coordination among responding agencies, information processing and sharing failures, and leadership failures.

Prior to the Katrina disaster, FEMA experienced a structural change in 2003 and became part of the Department of Homeland Security (DHS), which had a broader mission than FEMA. As a result, FEMA's mission became clouded, as its main focus shifted from natural disaster preparedness to counterterrorism. This policy brought reduction of the federal government's involvement in natural disasters. As an indicator of this policy change, more than two-thirds of grants distributed by FEMA went to counterterrorism. The National Response Plan at the time minimized the role of the federal government and indicated that disasters should be handled by the lowest level of government possible. Consequently, the new policy left disaster response in the hands of local and state governments and resulted in poor preparedness for natural events at the federal level. This "pull system," where local governments were mandated by policy to respond first while the federal emergency system was limited to a coordinating role, was in place when the hurricane disaster occurred. The pull system failed when Katrina wiped out the infrastructure for lower-level governments to call for aid. Officials admitted later that response to the disaster was beyond the abilities even of federal agencies. Minimum involvement, or the pull policy of the federal government brought lack of coordination among different levels of government, private, and nongovernmental agencies. One week after Hurricane Katrina made landfall, officials from different levels of government were still determining who was responsible for evacuation of victims.

Lack of communication (or at least poor communication) among levels of governments and/or agencies was another problem closely related to the inability to coordinate response. A lack of interoperable communication systems was cited as the main reason for this systemic flaw, despite the availability of funds. Disagreement among local and state agencies contributed to problems with interagency communication. These types of communication errors caused delays in evacuation and relief efforts that resulted in loss of life and property.

The chaotic disaster response during and after the hurricane was defined as a failure of leadership in crisis management. Leaders of federal emergency management were accused of lacking knowledge, expertise, experience, and leadership skills. Michael Chertoff, secretary of DHS, was made responsible by President George W. Bush for coordination of response to Katrina. He directed Michael Brown, director of FEMA from 2003, to coordinate response efforts at all levels of government and organize governmental and nongovernmental resources in the disaster area. Brown lacked experience in the field of crisis and emergency management. He was criticized for not coordinating the network of governmental and nongovernmental organizations that were prepared to respond to the event. He was recalled to Washington, D.C., and a few days later he resigned. Since this breakdown in emergency response, FEMA has been under new leadership.

Emergency management organizations learned several lessons from failure of the response to Katrina. The scope of Hurricane Katrina was beyond the capacity of all levels of government agencies. Being prepared and building capacity for natural disasters at this scope is essential for various levels of organizations. It was explicitly seen that the pull system did not work during the Katrina disaster, even though it might be appropriate in an event smaller in scale. One of the most important problems recognized in response to Katrina was lack of coordination among agencies. The responsibility and mission of the federal government in natural disasters needs to be specifically determined in advance. Furthermore, organizations learned that interoperability of communication systems is one of the key issues in effective communication. Management and leadership of emergency governance were harshly criticized by the public and the media during and right after the disaster. Crisis management requires a flexible leadership structure that is adaptive to contingencies of the event.

In both sectors, organizations that manage to remain solvent during these conditions can experience positive benefits from their shared experience of learning through failure. Recognizing the latent factors that contribute to organizational failure is vital to critical response that may be required to prevent failure.

Factors Leading to Organizational Failure

Environmental and organizational conditions are the two main factors contributing to organizational failure. First, organizations are faced with external environmental conditions that may be beyond their ability to predict. For example, radical changes in the environment, such as the market entry of a giant corporation to a specific industry, may result in failure for smaller organizations unable to develop strategies that can compete with the giant's capacity to achieve higher volumes and therefore lower prices. The uncertain impact of rapidly changing technology and resource limitations that may prohibit its purchase can also reduce an organization's ability to survive. Although organizations may be exposed to the same external pressures and environmental conditions, why some organizations decline and others manage to survive may be explained by the interaction with the second factor—internal organizational conditions.

Internal organizational conditions can be assessed by latent conditions such as leadership style and employee response to their decisions. Leadership style is an example of an underlying condition that may lay the foundation for actual failure but is not directly related to failure. For example, leaders who tend to stick with known routine procedures may not be adequate to adapt the organization through environmental changes that require a radically different strategic approach. As these "status quo" leaders gain in seniority, they are prone to believe that they are no longer vulnerable to risks and make decisions without seeking alternative courses of action. The unintended consequences of decisions made without careful analysis, information from external resources, and feedback from lower levels of the organization may further jeopardize organizational stability. As a result, latent conditions make organizations vulnerable to external and internal damages and thus trigger actual failures.

Together, the accumulated interaction of the consequences of latent organizational and environmental conditions may elicit further failure. For instance, bad leadership decisions are more likely to cause failure when the environment is turbulent, but they are less likely to cause decline when the organization is in a stable environment. Consequently, these two dimensions of a complex system rarely independently cause a direct impact on organizational status. However, financial crisis (external) or corruption (internal) within the organization may be extreme examples of how one factor may have a direct impact.

Analysis of Organizational Failures

Attempts to predict actual failure have relied on quantitative measures that are useful to predict an actual failure but are not preventive, thus allowing failures to occur. Next, review of an organizational failure begins with a gap analysis, where flawed or broken components in a process or individuals who inappropriately applied an existing process can be accused of causing the failure. This "bad actor" approach does not accurately represent the interdependence of an organization that must act in harmony and ignores the complexity of organizations, systems, and technologies. Hence, a methodology that recognizes the impact of organizational latent conditions in response to external environmental stressors is necessary to deter organizational failure.

Failure in Public Versus Private Organizations

Organizational failures can be expected to differ between public and private organizations because of the variance in mission objectives in these two sectors. The primary goal of a private organization can be defined as maximizing profit and/or market share in the industry, among many competitors. If a private organization is unable to compete, a macro failure (e.g., market exit, sudden decline in revenue for owners who funded the business) may result, since low performance is not sustainable in a competitive environment. A public organization's concern is not related to profitability or market share but rather to providing a necessary service or product to a vulnerable population. Therefore, a majority of public agencies are monopolies in their environment. In a public agency, poor performance tends to be accepted as micro failure because total exit from the sector is not an option. Performance is difficult to assess, as public resources can be used to maintain the organization during failure. Lenient measures such as reorganization are favorable options for failed public organizations.

Failure as a Learning Opportunity

The failures of an organization, as well as others in a similar field of operation, can provide a significant learning opportunity. One method known to increase organizational learning is receiving feedback. When feedback comes from outside the organization, likelihood of objectivity and accuracy of feedback are increased. Accurate and rapid feedback can improve organizational learning. However, organizational willingness to accept feedback is critical. Knowledge obtained from shared organizational failures and successes should be shared among members of the organization in order to create organizational memory. Organizations that are unable to retain their accumulated knowledge are more likely to experience loss of organizational memory and to repeat past failures.

This organizational learning framework is also valid for crisis management organizations. These organizations learn from their failures like any other organization, but the process is slightly different. Disaster response and relief organizations are generally less responsive to criticism during the early stages of operations, when emotional exhaustion and stress are high among personnel of the emergency management organization. Additionally, crisis management organizations learn from failures during response to extreme events that are rare and different in type. For example, after the response to a hurricane, crisis management agencies intensify their efforts to understand and evaluate their failures in response to the event. Next, their focus changes when a different kind of event (e.g., oil spill, earthquake) occurs. The pattern of learning in this area occurs event by event, in different categories. The events or failures in response to events lead organizations to develop a method or pattern of procedures. The pattern learned through a prior event is then applied as necessary to the next disaster. For example, the Federal Emergency Management Agency (FEMA) and American Red Cross encountered several problems in 1989 during responses to a hurricane and an earthquake in separate locations. After these organizations were the target of intense public and media criticism, they examined to what degree they were prepared for such events and measured their effectiveness in their relief operations. As a result, their next major crisis response was improved, and more positive assessments occurred.

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See Also: Federal Emergency Management Agency (FEMA); Hurricanes, Typhoons, and Cyclones; Interoperability; Political and Organizational Leadership; Preparedness.

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Overfishing

Once considered to be a renewable resource, over 80 percent of fish stocks are now fully exploited, overexploited, or significantly depleted. This decline has resulted in overfishing becoming one of the most pressing global environmental issues in recent decades. Many governments have acknowledged and identified the difficulties within their fishing industries and have implemented an array of management techniques in order to restore fish stocks and protect and preserve existing fisheries that are in danger of declining.

Overfishing can be generally defined as the fishing of a body of water to such an extent that the fish population cannot produce maximum sustainable yield on a long-term basis. Growing world populations have led to the demand for seafood more than doubling in the last 30 years. This demand—together with the rise of illegal, unreported, and unregulated (IUU) fishing; poor fisheries management; destructive fishing methods; and greater exploitation of the world's fisheries—is driving some fish species to the brink of extinction. A 2006 study of bycatch data by the journal *Science* concluded that if fishing rates continue at the current rate, all fish stocks will collapse by 2048. Approximately $50 billion a year is lost from the global economy through depleted stocks and poor management.

The global fishing industry sustains coastal communities through employment opportunities and by providing a valuable source of protein for local communities. Overfishing has several knock-on effects and can lead to greater crises, including reduced economic and social opportunities and ecological disruption, which can lead to the severe depletion of certain fish species and, in some cases, their extinction, The 1970s' Peruvian anchovy crash, 1980s' North Sea herring collapse, and 1990s' Atlantic cod collapse were disastrous events that greatly affected the local economy and harvests.

By the late 1980s, 90 million metric tons of catch had been removed from the oceans. As a result, fishing stocks have failed to recover, and the low availability of traditional fish stocks and the decline of major predators such as Bluefin tuna and Chilean sea bass have forced fishermen to fish further down the food chain, often in deeper waters, depriving other marine animals such as seabirds and seals of a regular source of food. Government subsidies and policies led to a rise of large-scale commercial trawlers, some capable of landing over 250 million tons of fish. International territorial fishing disputes, such as the 1950s' Icelandic cod wars and the long-running mackerel dispute between Iceland/Faroe Islands and the European Union (EU), have occurred constantly between neighboring countries over fishing rights.

Recognizing a growing crisis, in the 1970s coastal nations established and enforced a 200-mile exclusive economic zone. The EU's Common Fisheries Policy was introduced in 1983 in order to manage the fish stocks of the EU by setting quotas as to how much fish member states are allowed to catch. Critics have accused politicians of subsiding more fishing fleets than required, ignoring scientific recommendations, and introducing fishing policies that are only a short-term solution.

A range of management practices to restore and sustainably manage fish stocks have been utilized globally by governments and environmental organizations. Limiting/reducing landing quotas, equipment restrictions, no-fish zones, protection of breeding hot spots, expansion of marine reserves, local community management, and consumer pressure and awareness are just some of the most common methods being utilized. Since 1999, China has banned fishing in the South China Sea during the summer months. In 2010, the Pacific nations imposed a two-year ban on commercial tuna fishing in the Pacific high seas. The seas have recently reopened with limited access to trawlers in order to keep stocks at a sustainable level.

A catch of Alaskan walleye pollock is dumped onto a sorting table onboard the National Oceanic and Atmospheric Administration ship Miller Freeman *during a stock and food source assessment in September 2007. Although quotas have largely addressed the problem of human overfishing of Alaska pollock, burgeoning world populations have doubled the demand for seafood over the last three decades. That demand, along with illegal fishing and poor management and fishing methods has led to some fish species being near extinction.*

Bulgaria has imposed a four-year ban lasting until 2016 on sturgeon fishing in the Danube River and in the Black Sea. No-take fish zones established in the Cabo Pulmo Marine National Park have seen fish numbers increase 460 percent from 2001 levels. A recent international study of 42 coral reef fisheries by the Wildlife Conservation Society and other members concluded that local level comanagement of fisheries can curb overfishing and benefit local users. Sustainable fisheries provide many benefits, including greater food security and economic and social opportunities. Restoring fish stocks in the EU has been valued at 2.7 billion pounds a year and would result in the creation of more than 100,000 jobs.

However, as the demand for seafood continues to increase, IUU fishing is becoming a common occurrence in developing countries and particularly in west Africa. IUU fishing is estimated to bring in seafood worth over $10 billion a year, depriving local fisheries of economic opportunities, undermining legal fishing practices, and jeopardizing recovery measures put in place to protect fish stocks. Greater numbers of illegally caught abalone are confiscated from poachers than legally caught by fishermen in South Africa.

The Food and Agriculture Organization of the United Nations (FAO) released an international plan of action in 2001 to prevent, deter, and eliminate IUU fishing. In 2010, the EU introduced a new regulation to combat IUU fishing and counter the import of IUU fish products into the European Union. Despite strong management practices and strengthened law enforcement, enforcing these measures can still prove problematic. Many trawlers use sophisticated logistics and technologies to evade port authorities, so IUU fishing tends to favor poorer nations where there is a lack of policing and resources to detect IUU fishing trawlers.

Overfishing has been recognized as a grave environmental problem that has threatened livelihoods and jobs. Overfishing can be better combated by imposing restrictions on landing quotas, creating greater regulatory control and enforcement, and establishing no-fishing exclusion zones and marine parks. Governments have responded to the crisis by taking preventive measures aimed at restoring and protecting existing fisheries, and several documented case studies are emerging where fish stocks have returned to acceptable levels. However, IUU fishing and unsustainable fishing techniques are still frequent occurrences in the fishing industry, and their impacts are undermining the efforts of conservation schemes.

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See Also: Border Disputes; Global Food Crisis; Global Warming; Overgrazing; Sustainability.

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Overgrazing

Overgrazing is a type of environmental degradation that results in the loss of productive capacity of the grazing or pasture land. Overgrazing occurs when grazing of the vegetation cover, primarily by ungulates both wild (giraffe, moose, rhinoceros, deer, gazelle) and domesticated (horse, cattle, goats, pigs, sheep), is unsustainable and causes irreversible ecosystem damage. Globally, damage caused by overgrazing is estimated at 1.7 billion acres (680 million hectares), and approximately 20 percent of the pasture and rangelands worldwide have been degraded. The most significant land loss is in Asia, and it is especially pronounced in Africa.

Causes

Overgrazing is caused by inappropriate grazing practices, such as high animal-to-land density on a parcel of land for extended periods, that inhibit vegetation cover in combination with poor land management (e.g., lack of vegetation rotation, grazing during inappropriate vegetation life cycle and productivity, inappropriate species, grazing on lands that are poor for grazing or have previously been degraded by grazing). Land management is more critical because a few ungulates can overgraze an area if not managed properly. Similarly, if the land is properly managed, a large population of ungulates could live on a parcel of land without the damage of overgrazing occurring. Management of land is limited by access to suitable rangelands, competition with agricultural land, and available water resources, all of which cause grazing ungulates to utilize the marginal lands.

Overgrazing Effects

The effects of overgrazing on the natural vegetation are frequently irreversible, and the practice significantly contributes to loss of topsoil, increased surface runoff, desertification, and the loss of biodiversity. The main ecological effect of overgrazing is the loss of vegetation cover as a result of inappropriate grazing, especially in temperate and tropical highland savannas and drylands (i.e., semi-desert, grassland, and rangeland) located primarily in the global south. These savannas and drylands are home to some of the most impoverished people in the world. The practice of overgrazing allows the population to raise food in the short term, but the fragility of the drylands' ecosystems results in the limited vegetation being significantly degraded, which results in topsoil loss, and the areas then become prone to erosion, making it difficult for the people to utilize the local resources.

Overgrazing reduces or removes the amount of vegetation of a pastureland and is detrimental to the habitat and ecosystem. For example, the grazing ungulates do not eat all the vegetation; instead, they selectively graze the most edible species and leave weeds and the least edible species. The noneaten species become the dominant species for the ecosystem, resulting in the land being less suitable for future grazing. Aside from the proliferation of unwanted plants, the overall loss of vegetation causes reduced groundcover and the plants being distributed more sparsely.

Overgrazing is damaging to the soil because of the loss of vegetation and because the soil becomes compacted by the grazing ungulates. The loss or reduction of vegetation results in the soil being exposed to higher temperatures via direct sunlight, and many species die off. Many of the remaining and subsequent plant generations have shallow root systems, which in turn diminishes the soil's ability to hold down the soil, making it vulnerable to wind and water erosion. The compact soil makes it more difficult for future plant generations to grow. The loss of vegetation decreases the amount of organic material (e.g., humus) available for replenishing the soil with nutrients. Ultimately, the damage to the topsoil results in the pastureland becoming a barren wasteland. In addition, the loss of vegetation concentration, soil degradation, and shallow root systems result in the cultivation of seral communities and make the degraded grazing lands susceptible to fires.

The losses of vegetation and topsoil are the means for increased wind and precipitation erosion. The limited ground cover with a shallow root system is unable to maintain or replenish the water table. The loss of vegetation results in the soil being unable to absorb heavy precipitation, and the nutrient-rich topsoil is eroded or washed away. Without sufficient ground cover, the unabated runoff can result in floods. Ultimately, the loss of water cycle results in the land becoming a barren wasteland as well as the surrounding area being prone to periodic flooding.

The high density of livestock and the loss of vegetation and topsoil as a result of overgrazing significantly contribute to desertification. The fragile temperate and tropical highland savannas and drylands are very susceptible to desertification, which causes irreversible degradation of the entire pastureland ecosystem. For example, the removal of vegetation exposes the soil to direct sunlight, resulting in drought conditions, and the nutrient-rich topsoil becomes lost to wind and surface runoff. The regions most affected by desertification resulting from overgrazing are the drylands. The persistent environmental degradation and deficient soil make it difficult for local populations to utilize pasturelands because they become barren wastelands.

The loss of vegetation and topsoil, surface runoff, and desertification result in significant biodiversity loss. Overgrazing in these specialized microhabitats results in specific plant species becoming threatened and even extinct, as well as giving rise to the proliferation of alien species and further loss of plant biodiversity. The ungulates' selective grazing of the most edible species and leaving weeds and the least edible species is a significant contribution to the disruption to plant biodiversity. Once plant or animal species are lost, it is nearly impossible to reestablish them, even though most of the degradation of overgrazing is caused by domesticated ungulates. Overgrazing degradation of wild ungulates is caused primarily by the loss of apex predators (i.e., foxes, bears, lions, wolves, coyotes, tigers, wolverines, and big cats [cheetah, jaguars, cougars, lynx, leopards]). The loss of apex predators is significant to the biodiversity of an ecosystem; it can result in wild animals overgrazing fragile ecosystems and causing permanent damage. Without land management, overgrazing can become irreversible, resulting in the land becoming barren and unusable as a result of desertification and the loss of vegetation, topsoil, and biodiversity. Appropriate land management is the primary means to prevent overgrazing from transforming the land into a wasteland. If overgrazing results in the land becoming barren or a wasteland, the process is irreversible. Once the damage reaches an irreversible state, the management of the crisis requires the relocation of people or significant importation of food for their survival.

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See Also: Climate Change Adaptation; Global Food Crisis; Global Warming: Sustainability.

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Overpopulation

Population growth is the result of fertility, mortality, and migration. The population by itself is not problematic until the population exceeds the carrying capacity of an environment. Regardless whether there is a high or low population density, the number of people of a given area is only problematic if resources are insufficient. By definition, overpopulation occurs when a population has exceeded basic living standards of food, water, and shelter. Overpopulation is a combination of births, deaths, immigration, resource depletion, and environmental degradation. The population and fertility rates create the consequences of resource depletion and vice versa.

Total Population

The world's population is just over 7 billion people and growing at about 80 million people per year. It is estimated that the global population will reach 9.2 billion (range 8–10.6 billion) by 2050. Of the 7 billion people on the planet, approximately 4 billion, or 57 percent, live in 10 countries: China (1.3 billion), India (1.2 billion), United States (314 million), Indonesia (240 million), Brazil (195 million), Pakistan (179 million), Bangladesh (158 million), Nigeria (155 million), Russia (142 million), and Japan (127 million). Six of the most populated countries, along with three additional countries, will account for about half of the world's projected population growth by 2050. The growth rates of these nine countries from 2000 to 2050 will be 434 percent for Uganda, 334 percent for Ethiopia, 224 percent for Nigeria, 209 percent for Democratic Republic of the Congo, 91 percent for Pakistan, 89 percent for Bangladesh, 65 percent for India, 50 percent for the United States, and 3.17 percent for China.

By 2050, the 10 most populated areas will be India (1.6 billion), China (1.4 billion), United States (439 million), Pakistan (309 million), Indonesia (280 million), Nigeria (259 million), Bangladesh (258 million), Brazil (245 million), Democratic Republic of the Congo (189 million), and Ethiopia (185 million). Russia is projected to decrease to 109 million and Japan to 93 million. Of the projected 9 billion world population by 2050, Asian countries will account for almost half (47 percent), with 5.2 billion people, followed by African countries accounting for 21 percent or 1.9 billion people. Europe is projected to have 674 million, Latin America and Caribbean nations 765 million, and North America 448 million.

Crude Birth Rate and Total Fertility Rate

There are a couple of indicators for estimating the population. The first is the crude birth rate (CBR), which is calculated by taking the number of births in a given period (typically a year) and dividing it by the total population and then multiplying that result by 1,000. A CBR is displayed as the rate per 1,000 people. For example, China's CBR is 12.29 per 1,000, while Nigeria's is 35.51 per 1,000. CBR is considered a less precise fertility estimate tool because it can be skewed by the age distribution and the total population. The total fertility rate (TFR) is another indicator for estimating population. The TFR is more precise because it is an average approximation of children born per woman during her entire reproductive years (e.g., menarche to menopause) rather than the total population, which could include many people not of reproductive age. The TFR is considered a more direct means to measure population change in a state, a country, or the world.

The 2050 population projection of 9 billion (a medium variant prediction) is based on the assumption that the global fertility rate will decrease from 2.5 children per woman to 2 children per woman. If the fertility rate is slightly higher, the global population will reach 10.6 billion people by 2050 (a high variant prediction). These projections also assume that mortality rates will remain stable or unchanged. A TFR of around two children per woman is called "replacement" and is considered the "magic number" for population growth, which will result in the total population stabilizing by 2050. Presently, the global TFR is 2.47 children per woman, and the population is growing.

Globally, fertility rates have been declining since 1950. For example, from 1950 to 1955, the global fertility rate was five children per woman, and this dropped to 2.65 children per woman during 2000–05. Presently, the lowest TFR is in Singapore, at 0.78, and the highest is in Niger, at 7.52. The nine countries with the highest population growth are Uganda with a TFR of 6.65, Ethiopia (5.97), Nigeria (5.38), Democratic Republic of the Congo (5.09), Pakistan (3.07), India (2.58), Bangladesh (2.55), United States (2.06), and China (1.55). The fertility rate varies by geographical region. For example, in North America, the TFR ranges from 1.99 to 3.47. Other regions and their TFRs are Central America (2.66 to 6.38), South America (2.49 to 5.75), Europe (1.41 to 2.66), sub-Saharan Africa (5.53 to 6.7), Middle East and North Africa (3.37 to 6.99), Oceania (2.3 to 3.87), and Asia (2.43 to 5.85).

Current projections are that the TFR will reach replacement by 2050, providing that the more developed countries' fertility rates remain stable. The only regions estimated to have TFRs above replacement by 2050 are sub-Saharan Africa (2.61) and the Middle East and North Africa (2.09). Countries with the highest fertility rates are also the poorest, such as Afghanistan (5.64), Niger (7.52), Burundi (6.08), Mozambique (5.40), Burkina Faso (6.07), and Yemen (4.45). Afghanistan, Nigeria, and Yemen are expected to triple in population by 2050.

Globally, half of the countries are below replacement levels, such as Russia (1.54), Japan (1.37), South Korea (1.23), western European countries (e.g., Hungary [1.41], Italy [1.4], Spain [1.48]) and eastern European counties (e.g., Bosnia and Herzegovina [1.28], Ukraine [1.29], Lithuania [1.27]). Overall, these populations are expected to decline 20–30 percent by 2050. Some Middle Eastern countries just below replacement are Iran (1.87), Qatar (1.93), Algeria (1.74), and Lebanon (1.76). Countries near zero population growth are Macau (0.92) and Singapore (0.78). By 2050, over 50 countries will have populations lower than they had in 2005. Some countries, such as Australia, Canada, New Zealand, and the United States, have been at or below replacement for many years, but because of immigration, their populations are growing. Global population is projected to stabilize at 9 billion people by 2075 as a result of declining fertility rates.

Effects of Overpopulation

The effects of human overpopulation are considerable. Once the population grows beyond the carrying capacity of its location, the social system can break down. When the population exceeds the resources, living conditions and environmental degradation become noticeable. The insufficient resources of a given population can be food, water, shelter, and the ability to stay warm. Overpopulation results in the increased depletion of natural resources, such as fossil fuels, forests, arable land, fisheries, and plant and animal species. The depletion of resources increases problems of living by increasing pollution in the air, land, and soil. Environmental degradation results in lower quantities of drinkable water and food and can create unhygienic conditions in which new epidemics can occur. Some other characteristics of overpopulation are increased poverty (especially among children), higher fertility rates, reduced overall health, decreased life expectancy, poor diet/malnutrition, and decreased literacy. These conditions can result in social unrest, conflicts, and even war resulting from scarce resources, lack of available land, overcrowding, and/or unstable governments. Some critics argue that presently overpopulation is not a problem because we have enough resources to feed everyone, and that instead we have a food distribution problem. Whether or not there are resources for an additional three billion people is open for discussion.

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See Also: Carrying Capacity; Epidemics; Food Security; Freshwater Demands and Shortages; Poverty; Sustainability.

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Ozone Layer Depletion

The depletion of the ozone layer in the stratosphere of Earth's atmosphere was an alarming side effect produced by the use of new synthetic chemicals in the late 20th century. Because the ozone layer absorbs incoming ultraviolet (UV) radiation from the sun, there was great concern about the potential health effects of increased UV exposure. To address this crisis, the first universally ratified global environmental treaty was established in 1987, the Montreal Protocol. Quick, global action to reduce and eliminate ozone-depleting substances provided a successful crisis management strategy to slow and eventually stop the depletion of Earth's ozone layer.

Ozone (O_3) is an important gas in Earth's atmosphere. Though considered a pollutant near the surface in the troposphere, ozone found in the ozone layer between 9.3 and 18.6 miles (15 and 30 kilometers) above Earth's surface in the stratosphere is considered beneficial because it absorbs large amounts of incoming high-frequency ultraviolet radiation from the sun. Increased exposure to ultraviolet radiation raises the incidence of skin cancer and cataracts in humans, and it produces damage to other animals and plants, including reduced crop yields. Over the past 30 years, the incidence of skin cancer has increased significantly, from 1 in 1,500 to 1 in 75. The risk to human health helped spur a crisis management approach to address this important environmental issue.

Ozone occurs naturally in Earth's atmosphere when an oxygen molecule (O_2) is broken down into two free atoms of oxygen (O) by sunlight in the high atmosphere, and then one of those free atoms bonds with another oxygen molecule (O_2) to create ozone (O_3). However, ozone is unstable and is easily broken up by trace elements. A synthetic chemical invented in the 1920s, chlorofluorocarbon (CFC), made its way into the stratosphere, where UV radiation broke its molecular bond. This released chlorine atoms that then stole an oxygen atom away from ozone, a process that destroyed enough ozone to thin the layer and produce what we now refer to as the hole in the ozone layer.

The hole in the ozone layer (actually a substantial thinning of the layer) has occurred every spring since the 1970s over Antarctica, as announced in May 1985 by the British Antarctic Survey. This shocking announcement described that CFC was the culprit as it accumulated and concentrated in the atmosphere above Antarctica each winter, when the circumpolar vortex prevented mixing of air to dilute the concentration and very low temperatures made sensitivity to inorganic chlorine increase. Each Antarctic spring and early summer, as the atmosphere above Antarctica was exposed again to sunlight and UV radiation, the CFCs would break down and the free chlorine atoms would break down ozone molecules, thinning the ozone layer by as much as 65 percent.

The discovery of the thinning of the ozone layer was alarming to scientists and the public because it was not expected in the Antarctic, and it illustrated that humans can have a profound impact on Earth's atmosphere in a relatively short time span. This discovery led to a global agreement, the Montreal Protocol of 1987, which was a remarkably rapid and successful global crisis management solution. The Montreal Protocol established goals and timelines to phase out the use of CFCs and other ozone-depleting chemicals such as halons, hydrochlorofluorocarbons (HCFCs), and methyl bromide and to restore the stratospheric ozone layer. It was the first United Nations treaty that every member country signed. The Montreal Protocol has proven to be a successful agreement to phase out ozone-destroying chemicals by substituting other, ozone-friendly substances and chemicals, mainly in refrigerants, aerosol propellants, solvents, fire extinguishers, fumigants, and other industrial products. It is arguably the most successful global environmental agreement ever ratified. In the United States, the Environmental Protection Agency developed a flexible plan to phase out these chemicals by substituting other, less harmful, chemicals, and the United States met its goals successfully. The Clean Air Act was amended in the United States in 1990 and 1998 to protect the ozone layer. The success of this plan has been attributed to scientific accuracy, effective public policy, and market-based, flexible, innovative solutions and alternatives to ozone-depleting substances.

Although the thinning of the ozone has been halted, the stratospheric ozone layer will not be fully repaired until approximately 2075 because many of the halocarbons (such as CFCs) have a long residence time (50–100 years) in the atmosphere. In addition, notable thinning is now observed over the Antarctic and the Arctic during their respective springs until concentrations of ozone-depleting substances have time to be removed from the atmosphere. Therefore, educating the public about the dangers of high UV radiation exposure and techniques to reduce exposure such as staying indoors, using protective clothing, and applying sunscreen will remain important for decades to come.

Another recent concern is that CFCs and HCFCs are also greenhouse gases, though not as pervasive as others such as methane and carbon dioxide. In addition, the thickening of the ozone layer as it recovers means less UV radiation will reach the surface, which should slightly cool surface temperatures. Although the main concern from ozone layer depletion is increased UV radiation, there is a weak link to global warming.

Many see the global crisis management strategy, the Montreal Protocol, as a blueprint for a possible way to address climate change concerns and reduce the concentration of greenhouse gases in the atmosphere. However, the political leadership, fossil fuel alternatives, and dire human health consequences needed to spur action are not perceived as certain, severe, or imminent by many countries. Therefore, an effective global crisis management strategy to address global warming has remained elusive.

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See Also: Climate Change Adaptation; Environment Programme, UN (UNEP); Environmental Contamination; Global Warming; National Oceanic and Atmospheric Administration (NOAA).

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Pandemics

Preparations for global pandemics have been at the forefront of concerns for health care workers, governments, and individuals. As the world's population has increased and people live in more densely packed urban neighborhoods, the possibility of worldwide epidemics, or pandemics, has become more real.

A pandemic is the spread of a disease among large numbers of the population in a widespread geographic area. This could take place in several countries, or it could impact several continents or be global.

The ease and multiplicity of travel options, along with the modern propensity to travel, have made much more likely the possibility that an epidemic becomes a pandemic. As perhaps in few other areas, crisis managers have a crucial role to play in limiting a pandemic, or in responding to one should it develop.

The Spanish influenza pandemic from 1918 to 1919 was an example of the impact of a global epidemic. An estimated 500 million people were infected, and at least 10 percent of those infected died. Europe during the Middle Ages suffered with various outbreaks of plague. As recently as 2009, the H1N1 (swine flu) influenza outbreak reached pandemic levels and spurred much more thinking and planning for such global outbreaks.

Preparing for Pandemics

A pandemic is by nature a transboundary crisis. Pandemics cross political boundaries. We usually think of these boundaries as international, but the political boundaries can also be internal to a particular country. Functional boundaries are also crossed in pandemics, because multiple policy areas are impacted. Health systems are among the first policy areas we think of in a pandemic. However, financial, industrial, educational, and political systems, among others, are deeply affected by widespread disease outbreaks. With all the parties affected across the various boundaries, response to the crisis is made much more complex. Mutual dependencies are created, and the need for cooperation becomes acute. Without prior preparation for such a crisis, the various parties may have trust issues, not knowing if others can be trusted in the middle of the crisis. The more serious the crisis, the more necessary preparation, trust, and cooperation become.

Crisis managers must plan for many eventualities in preparing for pandemics. Preventive measures must first be addressed. The medical community, aided by a host of partners, must seek to develop plans of action that will keep an epidemic from becoming a pandemic. These plans must include medical as well as nonmedical actions. Efforts to stop the spread of a pandemic must also address the transportation capabilities available.

Many airports have the capability to scan arriving passengers with an infrared camera in order to detect those with fevers. Assessments must be made of the medicines or vaccines that will be effective in addressing the disease, and plans must include distribution systems for these medications. Of course, advance work must be done to prepare for the surge of patients that will sometimes overwhelm health care facilities. Governments and other actors will be tasked with mobilization of the vast resources that will be called for. Preparations must even be made for identification, storage, and burial of large numbers of bodies, which must include conducting funerals or observing other religious rituals when possible.

Global Response System

The World Health Organization (WHO) maintains the Global Outbreak Alert and Response Network (GOARN). GOARN is made up of over one hundred partner institutions from various countries and organizations that can provide the technical expertise needed to address global disease outbreaks. Partners assist with issues of alerts in response to outbreaks. This network acts in some ways as a crisis manager. The purposes of the network include preventing the intentional spread of diseases that could lead to an outbreak, seeing that technical help is made available quickly to those countries in which outbreaks occur, and aiding in preparation for epidemics that may occur. Mobilization is one of the major tasks of GOARN. There are 20 diseases within the purview of GOARN, including anthrax, avian influenza, dengue, Ebola, plague, smallpox, and yellow fever. WHO has implemented an event management system to collect, monitor, and disseminate information to GOARN and other interested groups. The WHO Web site makes available the latest information on outbreaks occurring throughout the world.

Train passengers in Mexico City, Mexico, wear masks as a precaution against the epidemic of swine flu that broke out in the city in April 2009. Schools, museums, libraries, and state-run theaters in the metropolitan area were closed and airline passengers were screened in an attempt to control the spread, but by June, the World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention declared the outbreak a worldwide pandemic. The death toll by January 2010 had reached 14,286.

The International Health Regulations (2005) were put into effect in 2007 after having been agreed to by almost 200 nations. These binding regulations were developed to provide a framework for WHO to deal with international crises involving disease outbreaks. The regulations seek the avoidance of all but the necessary interruption of the movement of people and products internationally.

Rapid discovery of outbreaks is of supreme importance for crisis managers. Health Canada designed a system for WHO that provides early detection of outbreaks in a substantial percentage of cases. The system mines the Internet for information that suggests the possibility of an outbreak. Google developed a similar tool to predict influenza outbreaks during 2008–09.

Managing the H1N1 Pandemic

The 2009 H1N1 pandemic was an opportunity for crisis managers of various levels to implement and test their preparations. In the United States, the Centers for Disease Control and Prevention (CDC) used many of the resources under its control to address the crisis. The CDC used its channels of communication to spread the word of the dangers of H1N1 and cooperated with countless other national and international partners in its response.

These responses included warnings, safety precautions, antiviral medication recommendations, and vaccination advancement. WHO implemented its procedures as well, going through its phases of response until, on June 11, 2009, in its sixth phase of response, it declared a global pandemic. Seventy countries had reported outbreaks of this strain of influenza; this number later doubled. Fortunately, the death rate from H1N1 did not reach unusual proportions.

Issues with unified communication are demonstrated by the fact that the White House warned that there could be 90,000 deaths in the United States as a result of the outbreak. The CDC, however, predicted that up to 30,000 could die. In the end, fewer than 20,000 people in the United States died of H1N1. Confirmed cases of death from this outbreak were much smaller than the estimated number of deaths. The outbreak did give crisis managers a good exercise in preparing for a global pandemic. The experience demonstrated that, other than an effective vaccination program, the United States did not have a comprehensive mitigation strategy in place. For a pandemic for which there is no effective vaccine, this could be disastrous.

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See Also: Biological Weapons; Centers for Disease Control and Prevention (CDC); Cholera; Drug Resistance; Ebola Virus; Emergency Medicine; Epidemics; Health and Medical Response Scenarios; Infectious Disease; Influenza; Public Health Surveillance; Quarantine; Severe Acute Respiratory Syndrome (SARS); Smallpox; Surge Capacity, Hospitals; Vaccinations.

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Panic, Nature and Conditions of

The word *panic* comes from the Greek *panikos*, of Pan, the goat-like shepherd god. In 490 B.C.E., at the battle of Marathon, he is said to have shouted so loud that the echoes of his voice as it rebounded from the surrounding mountains convinced the Persians that the Athenian forces were much more numerous than was actually the case, causing tumultuous dread to spread among the invaders. *Panikon deima* became synonymous with a sudden accession of fear by travelers in lonely places.

In modern times, it is quite possible that panic has become the most misunderstood of all social reactions to crisis and disaster. In part this results from a very widespread tendency to misidentify its symptoms and manifestations, and in part it is because social science research has been deeply equivocal about what panic actually is.

Panic can be defined as an acute reaction involving terror and confusion. It is usually associated with irrational behavior, or more properly "arational" behavior, in which actions are spontaneous and unpremeditated rather than necessarily counterproductive. Despite this general definition, there is a distinct difference between how panic is viewed by sociologists, psychologists, and people who are not specialists in social science.

In an extension of the panic concept, the term *moral panic* can be defined as an intense reaction by a population to an issue that is perceived to threaten the social order and discussion of which may be taboo, or at least highly controversial. Witch-hunts are an example of moral panic in the past, while in the present, it is more likely to apply to phenomena such as banking crises or pandemics. During moral panics, attitudes are volatile and hostility is manifest toward the originators of the perceived threat. Usually, the societal reaction is disproportionate to the actual size of any threat to the social order that may exist. Although moral panics can be engendered by phenomena that are related to extreme events, they are generally not the direct result of any kind of disaster. Moreover, moral panic has been criticized as a concept that is weak and questionable: it has been seen as little more than "fear of fear," an extension of mass anxiety. Nevertheless, the term has been extended to include elite panic, which is said to occur in a crisis situation when the people in charge are obsessed with the maintenance of order and fear that ordinary people will run out of control and indulge in looting and other antisocial behavior. Elite panic was identified in the botched official attempts to manage public reactions to Hurricane Katrina in New Orleans in 2005.

Sociological Definition

Sociologists view panic as a spontaneous defensive reaction resulting in an asocial response to a threat that is perceived to be severe and immediate. *Perception* is the key term, as whether or not the threat is material is rather less important than what the panicking person thinks it is. Panic is the response to a sudden, concrete accession of fear leading to an instinctive self-protective reaction. It often ends in flight from the perceived source of danger, although panic and flight are not synonymous because, first, not all panic results in the desire to flee, and second, not all flight is the result of panic. In fact, panic-induced flight must be the result of withdrawal from rational, organized, and adaptive social action. It is not a regression to "primitive" behavior dominated by violence and individualism, although in extremis it can end with unregulated competitive actions such as physically struggling to be first to leave the danger area.

Sociologists have studied panic since the 1920s. One problem with their work is that most of it has involved post hoc reconstructions of situations that may be incompletely or inadequately remembered by participants who acted during the crisis under great duress. Nevertheless, regularities have been observed. The most important lesson that the sociologists have provided is that panic is a relatively rare, highly transient phenomenon. In crowd situations, the fear that it embodies can be contagious and lead to mass reaction, most of which is imitative. In this way, groups of people may run away from the perceived source of danger. However, rational thought and social interaction tend to dispel the panic reaction in favor of more orderly behavior.

The classic situation in which panic occurs is one in which people fear entrapment, leading to serious physical injury. For example, on February 20, 2003, a fire broke out in a nightclub at West Warwick, Rhode Island, when indoor pyrotechnics ignited insulation material. The nightclub had a licensed capacity of 350 people, but 462 were present. The fire spread extremely rapidly, yet the first reaction of onlookers was curiosity, followed by disbelief. Evacuation took place through the main entrance, as few people were aware of the other exits. Initially, the egress was orderly and controlled. However, as the fire took hold, alarm sirens went off while individuals began to scream and suffer injury, and the pressure of bodies on the exit led some people to stumble and fall. With the exit blocked, panic and competitive behavior ensued. The flames propagated in the nightclub at 30 cm/sec., and the fire took hold in less than two minutes, allowing little time for rational, premeditated action. Similar events have occurred in many countries, and in the United States the worst such case, the Cocoanut Grove nightclub fire (Boston, 1942), led to 492 deaths. In this, as at West Warwick, many people attempted to leave via the main exit, which is indicative of how in panic situations people are unable to reason or evaluate alternative strategies and hence do what is familiar to them.

Despite such cases, one of the most striking things about panic is its absence from many situations in which it would be presumed to dominate. Directly after bombs had been detonated on trains in the London Underground subway system, the people caught up in the disaster showed a remarkable absence of panic despite scenes of physical dismemberment, loss of blood, dust, smoke, and fireballs, as well as underground entrapment in near total darkness. Moreover, the London case added credence to the suggestion that women are less susceptible to panic than men, as they appear to have less of a "fight or flight" mentality and possibly greater ability to appraise a situation rationally while under stress. This theory has yet to be fully confirmed by research. In addition, it may be that panic has cultural connotations, but sociologists have not been particularly active in following this lead.

In cases where panic has not been entirely absent, it has often been exaggerated in accounts recorded after the event. When H. G. Wells's book *The War of the Worlds* was dramatized for radio by Orson Welles and broadcast from New York on Halloween night in 1938, it was widely stated that many citizens believed that the Martians had in fact landed and were attacking the United States. Mass panic was said to have ensued. However, subsequent analysis suggested that newspapers, deeply in competition with radio at the time, had exaggerated the incidence of panic in order to show that radio is an unreliable, possibly dangerous, means of communication. One contributory element to any panic that did occur was the situation of apprehension and anxiety that already existed on the eve of global war.

Sociological researchers have noted that the early studies of panic needed first to free the concept from the stereotypes that had grown up around it. By the 1970s, panic was seen as linked to the breakdown of social order, and as this tends to be very robust, it was obvious that panic was given little credence by investigators, some of whom went to far as to label it as a complete myth. The breakdown of social order was seen in light of the rise of individualistic behavior, but by the late 1990s, sociologists had begun to consider panic more in relation to the abandonment of social norms. Once again, the most remarkable finding was how robust such norms were in the face of deeply threatening situations.

Subsequent research has introduced the notion that situational factors can be more important in causing maladaptive behavior than social ones. Consider, for example, the case of the vehicle ferry *MV Estonia*, which sank in the Baltic Sea during the night of September 27, 1994, while it was en route from Tallinn to Stockholm. Only 136 of the 989 people on board lived to be rescued. Of these, four times as many men survived as women. Although some panic was described in the accounts that survivors gave to the commission of inquiry, social norms—and gender norms—were widely observed as people tried, often in vain, to extract themselves and nearby people from the chaos that prevailed inside the listing ferry. Post hoc analysis suggested that panic and selfish actions were simply not factors in the high death toll, which would in any case have been hard to avoid. Essentially, confronted with severe and immediate danger, people tend to make an initial interpretation of visual and audible cues, formulate a survival strategy, and then give themselves over to actions, such as attempts at evacuation. If panic occurs, it does so in extremis.

The Psychological Definition

In 1917, Sigmund Freud diagnosed "anxiety attacks" in some of his patients. These are now labeled panic attacks and are distinguished from the more constant panic disorder, which denotes a general susceptibility to panic and is often associated with agoraphobia. According to the American Psychiatric Association's *Diagnostic and*

Statistical Manual of Mental Disorders (*DSM-IV*), panic disorder "is characterized by sudden attacks of intense fear or anxiety, usually associated with numerous physical symptoms such as heart palpitations, rapid breathing or shortness of breath, blurred vision, dizziness, and racing thoughts."

The association of panic with the nervous and cardiovascular systems, and with psychosensory functions, internalizes it in the patient and leads to a diagnosis that differs radically from that of the sociologists. It follows that the prevalence rates of panic disorder in the general population are relatively high—perhaps 2 percent, with concentration of the disorder in the 30 to 44 years age group. Although there appears to be nothing genetic about panic disorder, anxiety is sometimes hereditary, and biological dysfunction can lower people's resistance to nervous diseases. Although social conditions are often strongly implicated among the causes of panic disorder, crisis and catastrophe are not. This is understandable, as there is little connection between disaster and mental illness, other than post-traumatic stress disorder and cases of generalized depression. For the psychologists, panic tends to occur when a person's systems of values, interrelationships, and support mechanisms are suddenly swept away. This need not require a major emergency to happen.

Clearly there is a net distinction between what psychiatrists regard as panic and what the sociologists describe. The former tend to concentrate on the internal causes and manifestations of the phenomenon, while the latter emphasize its social connotations. In effect, they are not discussing the same phenomenon. However, a third view is worthy of examination, namely, how the public views the idea of panic.

Popular Definition

Despite decades of attempts by social scientists to free the concept of panic from its stereotype, this has proven remarkably resilient. We might denote it as the Hollywood view, for it is most exalted in popular culture, especially disaster movies, few of which make any attempt to reproduce the reality of social behavior.

In the public's eye, chaotic and ungovernable situations are manifestations of panic, which is a latent condition that is present in everyone's social makeup. Moreover, panic is treated as if it were symptomatic of the breakdown of social order and reversion to primitive forms of asocial, competitive, and perhaps violent behavior. In reality chaos and panic are far from synonymous, as the former may be comprised of myriad attempts to behave rationally under difficult circumstances, especially when there is insufficient information on which to base decisions about what best to do. Neither is flight diagnostic of panic. On September 11, 2001, when one of the towers of the World Trade Center in New York collapsed after a terrorist attack, people ran away. Far from being a spontaneous panic reaction, it was the only sensible thing to do. Nonetheless, quite a few of them paused in their flight to turn and photograph the evolving spectacle, which was of course a calculated rather than instinctive response.

Thus, for the general population, panic is a stereotype that survives because it is never questioned, a convenient form of shorthand for complex circumstances. For the news media, it is often a substitute for rational analysis, something that is assumed to occur without ever verifying whether that is actually the case. For emergency managers, panic can be an excuse: the assumption that "people will panic," again invariably untested and unquestioned, is used as a motivation for introducing measures that are restrictive, unpopular, and sometimes quite unjustified. Moreover, it may be used as a motivation for secrecy in the adoption of crisis measures, and secrecy is attractive because it divests decision makers of responsibility through accountability. In reality, people are probably more likely to panic if they are *not* given information than if they are told about the reality of certain situations.

Unfortunately, the persistence of the panic myth or stereotype in popular culture also has a negative impact on crisis decision makers. Surveys show that many professional crisis responders believe wholeheartedly in the occurrence and importance of the phenomenon. In reality, it should not be used as a factor in crisis planning and will have little impact on emergency response. Moreover, the burgeoning counterterrorism literature shows that many experts on chemical, biological, radiological, and nuclear (CBRN) threats (mainly physicists, chemists, toxicologists, and physicians) are not sufficiently informed of the sociological literature to put panic in its proper perspective when they devise their attack scenarios. Instead, they tend to assume that it is bound to occur at the slightest provocation.

Conclusion

Clearly, panic is a difficult concept that has not generated a stable consensus on what it is and exactly how it occurs. Extreme views imply that it is either latent in all people or a myth of very little importance during crises or at any other time. More modulated approaches suggest that psychological panic attacks are quite common and largely unrelated to major societal emergencies, while panic in the social sense is a rare and brief transient phenomenon that takes places only under specific circumstances, such as impending entrapment coupled with extreme danger.

In one of the most comprehensive reviews of the phenomenon, Christian Rogsch and his colleagues at several German universities looked at 127 cases of reported crowd crushes and stampedes that occurred over the period from 1863 to 2007 and found that in nearly 40 percent of cases, the evidence for the occurrence of panic was ambiguous or lacking. They also noted that the term is particularly difficult to define satisfactorily, and attempts to simulate panic with volunteer subjects have tended to produce mediocre results.

Collective panic may be contagious in a crowd and may be more likely to occur when the cultural characteristics of a particular social group favor it, perhaps through the prevalence of latent collective anxiety or social instability. Although it is tempting to conclude that more research is required, this is perhaps not indiscriminately true: it would be more useful to start by connecting existing research in a wide variety of fields, including sociology, psychology, psychiatry, crowd dynamics, transportation safety, and emergency medicine.

The question remains as to what can be done to reduce the incidence of panic and make it less likely when threatening circumstances occur. Giving people training in safe evacuation procedures can help; so can acquainting them with the realities of a threat. Generally, people react more calmly and rationally if supplied with information than when it is withheld from them. Hence, the old adage, "don't tell them, they may panic" is the wrong approach to emergency planning, as people who have the means to make informed decisions are less likely to panic than those who can only use their imaginations to envisage what is happening. In terms of crowd behavior, much can be done to avoid crushes and stampedes by ensuring that crowd volumes and flows are properly regulated, unrest is avoided, and potential bottlenecks are not dangerous. This requires careful design and construction of the host environments for mass gatherings (such as stadia, entrance gates, ramps, and stairways), surveillance of potential troublemakers, and rapid intervention by the forces of order if trouble looks likely to break out.

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See Also: Decision Making Under Stress; Health and Medical Response Scenarios; Trauma.

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Paradigm Blindness

The concept of paradigm blindness implies that individuals, groups, and organizations are unwilling or unable to accept any challenge to their core ways of making sense of the world and determining how they interpret and make sense of what goes on around them—in essence, their worldviews (or *weltanschauung*—according to philosopher and psychologist William James in 1904). There have been attempts by numerous scholars to describe this process, for example by Thomas Bates (1975), Peter Checkland (1981), and Thomas Kuhn (1996), and the terms *hegemony, weltanschauung,* and *paradigm* have all been used at various times to describe and debate the various processes by which such a dominant worldview is developed and sustained. Against this wider background, and before considering the nature of paradigm blindness, it is first necessary to set out the nature of the term *paradigm.*

Paradigm Defined

In his 1962 study, historian and philosopher of science Thomas Kuhn established the notion of a paradigm as an important element in shaping the ways in which groups coalesced around a set of ideals and worldviews. From Kuhn's perspective, a paradigm was seen as representing "the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community," while at the same time it was also seen as denoting "one sort of element in that constellation, the concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science."

Paradigms can, therefore, be seen to develop over time. They allow those people trained within the knowledge parameters established within the paradigm to use those "puzzle solutions" as a means for subsequent problem solutions. The generation of paradigms creates a sense of consensus around the core elements of the tradition that are difficult to challenge without a significant "shift." In organizational terms, paradigms become grounded in the history, culture, and underpinning assumptions of the organization or group that forms them. New staff are recruited into that culture. Although new insights may generate additional knowledge, this does not always provide a fundamental challenge to the tradition itself. It is here that the relationships between what former U.S. Secretary of Defense Donald Rumsfeld, in his 2011 autobiography, termed the knowns and unknowns (both known and unknown) are important elements in shaping behaviors around risk and uncertainty.

According to sociology professor Derek Phillips, in many respects, the notion of paradigm has much in common with that of *weltanschauung*—or worldview—particularly in terms of knowledge generation, and the latter term has also been used within academic approaches to dealing with systems. These systems perspectives played an important role in the development of early theories of crisis management and human error. The notion of *weltanschauung* is important in shaping the manner in which we receive, filter, and make sense of the problems that we face. This worldview is also a factor in shaping, and is shaped by, the dominant organizational paradigm in which we operate. Within the literature on intelligence and foreign policy crises, this process has been termed "blindsiding." In an early exposition of the term, James argued that the relationship between the knower and what is known is an important one, thereby highlighting the importance of direct and indirect experience in the construction of the "known." Sociologist Barry V. Johnston discusses this process of knowledge construction, arguing that theory is often developed around an individual or a corpus of work. It is then extended and disseminated by "interpreters" and "converts," thus ensuring that the group shares the knowledge base with a wider audience, thereby extending the power of the ideas and concepts. It is this process of knowledge construction, dissemination, and defense that has important implications for the generation of, and response to, organizational crises by generating the conditions for paradigm blindness that leads to crisis incubation.

Paradigm Blindness Operating at Two Levels

According to Kuhn, it is possible to see a paradigm functioning at two levels, both relevant to the processes of paradigm blindness and crisis management. The first of these occurs at the organizational level, where it is possible to see paradigms generating the potential for a form of widespread blindness among organizational members through a resistance to competing views of the world. The organization's culture—the way things are done within the organization—provides a powerful lens through which members see the world and make sense of it. Thus, managers can refuse to see the validity of any challenges made to their decision making because they are convinced of the primacy of their own assumptions. This can ultimately result in what sociologist Barry A. Turner in 1978 called the "incubation" of failure potential within the decisions made by the organization. This process has also been conceptualized by psychology scholar David Collingridge in terms of the creation of "error cost," in which the strategies and operational processes of the organization are not subjected to critical analysis by views from outside the dominant paradigm. As a consequence, the errors are not identified until such time that they generate failures.

The second level at which paradigm blindness can be generated is at the level of the individual or subgroup within an organization. Here, other cultural influences may impact on the individual, and these may be at odds with the dominant worldview within the organization. One manifestation of this blindness can occur as a consequence of the accepted shortcuts that are taken in decision making and problem solving and that are based on the underpinning philosophies, training, and knowledge base of the individual members of the group or profession. These shortcuts often arise as a function of the specific experiences of people within the organization who may have evolved ways of working that deviate from the "planned-for" procedures. More recent research in psychology by Daniel Simons and Christopher Chabris has highlighted the role of "inattentional blindness" in determining the responses made by individuals toward information, especially when they are performing under conditions of high cognitive load. Under conditions of an active or operational crisis, such "blindness" will be an important contributory factor within the performance of crisis management teams that are operating under considerable pressure.

In addition, the manner in which people make sense of the world around them will also be shaped by the dominant paradigm and ultimately help continually reinforce that dominant worldview. Thus, paradigm blindness can serve to generate the potential for crisis at a number of levels, and this dominant mind-set is often only overcome as a consequence of the very crisis that it helps generate—by shattering the belief systems underpinning the worldview. Therefore, is possible to see a process in which the dominant way of making sense of the world allows for the nature of problems to be seen in a particular way until the organization or community is faced with a sufficiently powerful anomaly that shatters the underpinning assumptions of that worldview. Usually, this takes the form of a crisis.

Emergence of the Paradigm Blindness Notion

Within the academic literature, such as Carole Edelsky's work in 1990, the notion of paradigm blindness initially emerged as a means of explaining the processes by which experts failed to see the logic of other perspectives and interpretations of phenomena. In 1993, professor of education Jon Wagner made the distinction between "blank spots" and "blind spots," with the former being seen as a function of a lack of evidence and understanding and the latter existing in an area in which we fail to consider alternative interpretations and explanations of phenomena. Paradigm blindness will invariably contribute to the development of blank spots by serving to reject attempts at knowledge construction that are at odds with the dominant worldview, in what could be seen as a self-reinforcing process. Here, a phenomena is not adequately researched and understood because its causal factors and characteristics cannot be explained within the constraints of the dominant worldview; therefore, it is rejected. This relates to Kuhn's initial conceptualization of the term. In 1996, Kuhn observed that as paradigms shape the ways in which scientists (or managers) are trained, they will then find it difficult to challenge those paradigms, because they "are committed to the same rules and standards for scientific practice. That commitment and the apparent consensus it produces are prerequisites for normal science, i.e., for the genesis and continuation of a particular research tradition."

Thus, the paradigm is an important integrating element for organizations and professional groupings. It helps shape those who are admitted into the community or organization (as they all share the common views and values), and it also serves to provide boundaries regarding what is seen as being the acceptable limits of those views and the ways in which the system operates. Like the notion of hegemony, the paradigm serves to reinforce the power of dominant groups within society.

Crisis Against the Dominant Paradigm

Against this background, paradigm blindness can be seen to occur when challenges to that dominant tradition are dismissed simply because they do not fit the preconceived view of the world that dominates within that organizational setting. Ultimately, a crisis is the main means of shifting the dominant view within a paradigm away from its normal state in such a way that the worldview changes. Kuhn argues in *The Structure of Scientific Revolutions* (1996):

> Confronted with anomaly or with crisis, scientists take a different attitude toward existing paradigms, and the nature of their research changes accordingly. The proliferation of competing articulations, the willingness to try anything, the expression of explicit discontent, the recourse to philosophy and to debate over fundamentals, all these are symptoms of transition from normal to revolutionary research.

However, such dominant paradigms, especially within organizations, may also serve to generate a sense of blindness to new ways of framing and making sense of complex problems and, ultimately, may lead to the incubation of crisis potential. These systems perspectives played an important role in the development of early theories of crisis. The notion of *weltanschauung* is important in shaping the manner in which we receive, filter, and make sense of the problems that we face. This worldview is also a factor in shaping, and is shaped by, the dominant organizational paradigm in which we operate. Within the literature on intelligence and foreign policy crises, this process has been termed *blindsiding*.

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See Also: Bankruptcy, Corporate; Crisis, Definition of; Disruption of Organizations; Organizational Failure; Political and Organizational Leadership; Training.

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Paul G. Allen Foundation Emergency Relief Program

The Paul G. Allen Foundation Emergency Relief Program is a program designed to distribute funding in the form of grants to various groups. The Emergency Relief Program is specifically targeted at assisting vulnerable populations, especially to help people meet basic needs and to reinforce social safety nets.

Paul G. Allen Foundation

The Paul G. Allen Foundation is an organization founded by Microsoft cofounder and philanthropist Paul G. Allen and Jo Lynn Allen in 1986. The foundation is designed to help communities through grants that assist nonprofit groups, particularly in the Pacific Northwest, including the U.S. states of Alaska, Idaho, Montana, Oregon, and Washington, predominantly in Washington. Between 1990 and 2011, 60 percent of its grant money was distributed in Washington. The foundation also grants funding to other states and internationally.

Five key areas are supported by the foundation's grants: the arts, education, science and technology, social safety nets, and vulnerable populations. Although its endeavors support a variety of initiatives, those focused on strengthening social safety nets and meeting the needs of vulnerable populations fall largely under the Emergency Relief Program. Some of these efforts ultimately offer assistance for crisis and emergency relief, supporting the endeavors of crisis managers. These targeted efforts include assistance needed by individuals and communities during the ongoing economic recession in the United States and abroad.

Vulnerable Populations

Vulnerable populations are defined in a variety of ways by many different experts and organizations. Vulnerability includes characteristics that put an individual or group at greater risk. These characteristics are based on different circumstances, such as social, environmental, or economic influences. Vulnerable individuals are often part of multiple vulnerable populations. For example, children can also be poor and thus face problems related to their status in both populations (the young and the poor).

The foundation's Emergency Relief Program offers a series of grants to assist vulnerable populations and to strengthen the social safety net to further aid those groups. Many of the foundation's efforts in the Emergency Relief Program focus most strongly on meeting the basic needs of vulnerable populations, especially the need for food. Such efforts may be needed for any vulnerable group, but particularly for low-income individuals and groups—vulnerable populations who often cannot afford enough food or nutritional food.

The reduction of vulnerability is critical for short- and long-term aid efforts for individuals, both during and outside crises. It is also extremely important for ongoing emergency, crisis, and disaster preparedness, as vulnerable populations often face more and higher levels of risk to various crises. Since crisis management includes the identification and reduction of vulnerabilities, work by organizations like the Paul G. Allen Foundation's Emergency Relief Program is useful to help other groups not only identify vulnerable populations but also find which efforts work best to reduce their vulnerability.

Emergency Relief Program

Examples of the foundation's assistance through the Emergency Relief Program in recent years include grants to the Cascade Land Conservancy in Tacoma, Washington, to increase the availability of fresh vegetables at local food banks; to the Yamhill Community Action Partnership in McMinnville, Oregon, to build a client services center and a food bank; to YouthCare in Seattle, Washington, to support meals for homeless young people; to the Church of Mary Magdalene in Seattle, Washington, to support meals for homeless women and children; and to Rotary First Harvest in Seattle, Washington, to strengthen the operating capacity and expansion of local food banks. Between 1990 and 2011, the foundation gave away $5 million through the Emergency Relief Program, 1 percent over its overall grants. How these funds are used specifically to help vulnerable populations varies among different organizations. Thanks to a 2009 grant, for example, Northwest Harvest, a group that distributes resources to food banks in Seattle, was able to purchase high-protein food for local food banks and meal programs.

The foundation's efforts are focused on helping vulnerable populations over time. However, it is important to remember that assistance offered to vulnerable populations is a key component in long-term crisis management because vulnerable populations are often most affected by crises and least able to recover on their own. By offering aid to vulnerable populations outside moments of crisis, organizations may be able to reduce their vulnerability, potentially meaning that they will be less at risk for emergencies, crises, and disasters.

Basic Needs Program

Though the foundation's Basic Needs Program has been in operation since 2008, the shift of some grant monies from the Emergency Relief Program is more recent, beginning in 2012. These grants are such high priorities that the Paul G. Allen Foundation does not accept unsolicited proposals, but instead only accepts applications from and issues grants to invited organizations.

In 2012, it was announced that the foundation's efforts to aid vulnerable populations in Washington State would move from its Emergency Relief Program to a new Basic Needs Program. The aid and transfer to a new program emerged from the ongoing economic problems in the United States as a whole (as well as other areas) and Washington State's budget problems specifically. A large part of this focus will be in King County (the Seattle area). As a result, the foundation worked to provide basic needs to vulnerable populations in the area, including food and shelter. This shift is supposed to be a short-term transition, largely in response to the economic crisis. These grants are set to fund programs through 2013.

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See Also: Hazard Vulnerability Analysis; Nongovernmental Organizations; Vulnerability; Vulnerable Populations.

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Peacekeeping

Peacekeeping is one tool used by the United Nations (UN) to provide security and support to help countries in conflict to create a lasting peace. Peacekeeping operations are usually deployed after a cease-fire has been reached. There are three basic principles to peacekeeping: consent of the parties involved, impartiality, and the lack of use of force except in self-defense or for the defense of the mission. Peacekeeping operations also need to be seen as legitimate and credible, especially in the eyes of the local population, in order to be successful. The two main forms of peacekeeping mission are traditional and multidimensional peacekeeping.

Traditional Peacekeeping

Traditional peacekeeping missions are essentially military in nature and are conducted with the consent of the parties involved in the conflict only after a cease-fire has been agreed upon. Nearly all of the UN missions between 1945 and 1988 were traditional missions. Activities may involve monitoring and reporting on adherence to the cease-fire or other agreed-upon terms and investigating complaints of violations of those terms. Under this type of mission, military and diplomatic efforts proceed separately.

Multidimensional Peacekeeping

The international environment changed near the end of the Cold War and saw a rise in the number of internal armed conflicts, as opposed to conflicts between nations. With this change in environment came a need for a different type of peacekeeping mission—one that involved multiple dimensions. Multidimensional operations may incorporate military, police, and civilian components. Such operations may be used to support a transition to a legitimate government, such as supervising elections or transporting refugees to resettlement areas, among other activities not undertaken in a traditional peacekeeping mission. In addition, multidimensional operations often play a direct role in diplomatic or political efforts to resolve the conflict.

Peacekeeping is one of several interrelated activities the UN can use to maintain peace. Other activities include prevention, peacemaking, peace building, and peace enforcement. The line between these activities is not always clear, and strategies often overlap with one another as the situation changes. Although peacekeepers often support a cease-fire, they may also play a role in peacemaking and peace-building activities. An important difference between peacekeeping and peace enforcement is that a peacekeeping mission may include the use of force at the tactical level, while peace enforcement may involve the use of force at the strategic level.

Peacekeeping Reform

In 2000, the UN analyzed how it engages in peacekeeping as a result of increased demand for UN peacekeepers. Not only were peacekeeping forces in higher demand, they were also being sent into increasingly remote and volatile environments. The Brahimi Report, named after the chair of the panel responsible for the report, assessed the shortfalls of the peacekeeping system as it existed at that time and recommended some changes. The panel specifically noted that peacekeeping operations need to have clear and achievable mandates and that missions must have proper resources and equipment in order to be successful. The panel also called for increased financial support for missions and a renewed political commitment on the part of UN member states.

UN peacekeeping forces comprise personnel from member nations, as the UN does not have its own military force.

As of January 2012, there were 16 UN peacekeeping operations on four continents around the globe and one special political mission (in Afghanistan), with more than 119,000 personnel serving in these operations. More than 84,000 are troops and military observers, 14,500 are police, more than 5,500 are international civilian personnel, 12,500 are local civilian personnel, and 2,400 are UN volunteers—all from more than 160 member nations.

The following are the ongoing peacekeeping operations and the year the mission began:

- United Nations Supervision Mission in Syria, April 2012
- United Nations Mission in the Republic of South Sudan, July 2011
- United Nations Interim Security Force for Abyei, Sudan, June 2011

A Brazilian United Nations (UN) peacekeeper walks with Haitian children during a patrol in Cite Soleil, a section of Port-au-Prince, Haiti, March 16, 2010. Several U.S. and international military and nongovernmental agencies conducted humanitarian and disaster relief operations as part of Operation Unified Response after a 7.0-magnitude earthquake caused severe damage in the area on January 12. UN peacekeeping personnel come from member nations, as the UN does not have its own military force.

- UN Organization Stabilization Mission in the Democratic Republic of the Congo, July 2010
- African Union–UN Hybrid Operation in Darfur, Sudan, July 2007
- United Nations Integrated Mission in Timor-Leste, August 2006
- United Nations Stabilization Mission in Haiti, June 2004
- UN Operation in Côte d'Ivoire, April 2004
- UN Mission in Liberia, September 2003
- United Nations Interim Administration Mission in Kosovo, June 1999
- UN Mission for the Referendum in Western Sahara, April 1991
- United Nations Interim Force in Lebanon, March 1978
- United Nations Disengagement Observer Force, June 1974
- United Nations Peacekeeping Force in Cyprus, March 1964
- United Nations Military Observer Group in India and Pakistan, January 1949
- United Nations Truce Supervision Organization, May 1948

Details on each of these missions, as well as completed missions, may be found on the United Nations Web site, www.un.org.

Creating a New Peacekeeping Operation

In order to form a new peacekeeping operation, there are several steps that need to take place. Initial consultations involving UN officials, the would-be host government of the operation, member states, and any other relevant players are held to discuss the type of response the international community might provide. A technical field assessment is then conducted in the area where the peacekeeping operation is needed. The goal is to assess the situation on the ground, including security, political, military, and humanitarian rights conditions. The UN Secretary-General uses the information from this assessment to create a report to present to the UN Security Council outlining various options the UN can take in the region, as well as costs estimated for the operation. The UN Security Council then decides whether a UN peacekeeping operation is the best step to take. If the Security Council does decide to go forward with a peacekeeping operation, it adopts a resolution that outlines the size and goals of the operation. The Secretary-General appoints a Head of Mission, Force Commander, Police Commissioner, and senior staff. The Head of Mission, along with the Department of Peacekeeping Operations and the Department of Field Support, then plans the military, political, and administrative aspects of the mission. Deployment of the operation may then begin as soon as possible.

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See Also: International Strategy for Disaster Reduction, UN (UNISDR); Office for the Coordination of Humanitarian Affairs (OCHA), UN.

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Perimeter Control

A perimeter control is normally a secure boundary protecting an area or a building on a permanent basis through which only authorized people are allowed to pass. However, temporary perimeter controls, or cordons as they are often known, are set up on a regular basis in response to actual or threatened crises, either to prevent something happening or to aid response and recovery when something has occurred.

To Prevent Something From Happening

Premises that are considered dangerous or hazardous, for example, nuclear and chemical plants and airports, have permanent physical perimeter controls consisting of fences and other barriers to prevent unauthorized people from gaining entry and either harming themselves or causing mischief; so, too, do iconic buildings, government offices, and military and law enforcement premises. Electronic perimeter controls are set up to prevent cyber crime and cyber warfare or the "mischief-making" hacker from entering computers and ancillary programs, and organizations should seek advice from computer security experts on the requirements for ensuring the safety of their information and programs.

Hotels and places in which crowds gather—for example, shopping centers—where acts of terrorism may be anticipated are likely to have one or more perimeter controls on either a temporary or permanent basis, to deter such attacks. The outer perimeter control may be some distance from the target, where vehicles are checked, while the inner control could well be at the entrance to the potential target. In such cases, the outer control may be supported by physical barriers, such as fencing and gates, and even immovable concrete blocks. Both perimeter controls may be supported by closed circuit television and other technical measures such as intruder detection systems. Although in some cases such controls may be manned by law enforcement officers, generally, if the target is privately owned, they will be provided by private security companies.

Perimeter controls are often used to prevent protesters from reaching the target of their protest. For instance, since the rise of the antiglobalization movement, fences, backed by law enforcement officers, have been built around a number of meeting places for the G8 and G20 Groups, the World Trade Organization (WTO), the International Monetary Fund (IMF), and the World Bank. Similarly, in industrial disputes, particularly when the organization that is the subject of the dispute is still operating, law enforcement officers may implement a cordon to prevent those on strike from accessing the premises.

When a counterprotest is mounted as part of a community's response to a demonstration, for example, when antifascist groups meet in opposition to a meeting being held by extreme right-wing groups, it may be necessary for law enforcement agencies to place perimeter controls or cordons around one or both groups in order to prevent clashes. These perimeter controls normally consist of law enforcement officers and are sometimes controversial, depending on how long people are detained within the cordons.

To Aid Recovery After a Crisis

In the event of many crises—for example, acts of terrorism, outbreaks of infectious diseases, riots, industrial accidents, fires, earthquakes, and weather-related events such as hurricanes and tornadoes—it is essential that one or more of the emergency services gain control of the affected area as quickly as possible in order to bring the crisis under control and aid recovery. An important aspect of control is the introduction of perimeter controls. During the early stages, particularly if people have been killed or injured or are trapped, the initial response is invariably provided by the community itself but, as soon as the emergency services are present in sufficient numbers, the public may be physically excluded because (1) they may hinder the response and recovery and (2) additional people may become victims, particularly if the location of the crisis is hazardous or the crisis is ongoing.

Following a crisis that has a fixed site, the emergency services will want at least two, if not three, perimeter cordons to be implemented, generally by the law enforcement agency responsible for the area. The inner cordon will surround the crisis site. No one except those who have a role to play in bringing the incident under control (e.g., fire personnel and paramedics, and, in certain cases, law enforcement officers) should be allowed to enter the inner cordon. The emergency services will generally set up their forward control points at the edge of the inner cordon. The role of the outer cordon is to keep all people who are not involved in the response completely away from the scene. Between the inner and outer cordons, the emergency services and other relevant agencies are likely to set up their incident control points and support facilities, for example, the survivor assembly point, casualty clearing station, the ambulance loading point, temporary mortuary, and vehicle marshaling area. A rendezvous point and media liaison point will be set up at different points close to the outer cordon. The area between the inner and outer cordons will be kept sterile.

Both inner and outer cordons may be marked by "do not cross" tape, supported by a suitable number of law enforcement or private security personnel to ensure adherence to the message given by the tape. If the incident has occurred at a particularly busy location, it may be necessary to introduce a third perimeter control to divert traffic away from the scene to allow emergency vehicles free passage. In such cases, law enforcement or security personnel are likely to be supported by temporary traffic signs indicating no entry or diversions. On occasions when the incident is ongoing, for example, when a hazardous substance is escaping from a chemical or nuclear plant or a fire is spreading rapidly, the perimeter controls will be moved in accordance with the spread of the incident.

The use of perimeter controls or cordons is a regular feature of public order policing in that it has an important role to play in bringing disorder under control once people have gone on the rampage. Under such crowd control circumstances, perimeter controls are likely to be implemented to (1) prevent more people from joining the riot and (2) to assist in an orderly dispersal once the disorder is brought under control.

Some crises, such as acts of terrorism, are crimes. Given this, one or more perimeter cordons will be introduced with protective tape or barriers to protect evidence and to allow law enforcement officers to carry out their investigation without interference from the public or the media.

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See Also: Cyber Crime; Cyber Security; Cyber Warfare; Evacuation; Fires; Floods; Incident Management; Incident Response; Infectious Disease; National Incident Management System (NIMS); Operational Plans; Protest; Riots; Terrorism.

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Petrochemical Risk

The vast quantities of petrochemicals in use throughout the world create a significant risk of exposure following spills from pipelines, tankers, and production facilities. Petrochemicals can be broadly classified into four groups: crude oil, middle distillates, gasoline, and petroleum gases. Crude oils are naturally occurring compounds produced from the decomposition of plant and animal matter after thousands of years under high pressure and temperature. Gasoline is distilled from crude oil stocks and is the primary fuel for automobiles and small engines. The middle distillates include diesel fuel, jet fuel, kerosene, and heating oil. The most common petroleum gases include methane (natural gas) and liquefied petroleum gas (LPG). These products are for the most part complex mixtures of hydrocarbons, additives, and blending agents, and therefore, crisis management of petrochemical risk requires a thorough understanding of the various hazards presented by the specific chemicals and environmental factors involved. Flammability and the potential for explosions are key hazards whenever dealing with petrochemicals.

The primary health-based risks are from exposures to polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylene, naphthalene, hexane, and hydrogen sulfide. Ultimately, individuals properly trained to handle petrochemicals should conduct emergency response operations to mitigate the hazards.

Mitigation of Hazards

For each of type of petrochemical, local, state, and federal agencies will coordinate with spill response contractors and consultants to prevent or minimize any hazardous exposures. Spill response contractors will provide manpower and specialized equipment for repairs, recovery, and cleanup services. This equipment can include booms, absorbents, vacuums, skimmers, and dispersant or gelling agents. During the response, environmental consultants will monitor the air, water, and land surrounding the impacted area to ensure appropriate use of personal protective equipment (PPE) for the responders and protective evacuations for any adversely affected worksite or community. Testing will continue throughout the cleanup operations to ensure final compliance with established environmental regulations.

Crude Oil

Crude oil comprises of a complex mixture of hydrocarbons. These range from low-molecular-weight volatile aliphatic hydrocarbons to high-molecular-weight compounds with little or no volatility (i.e., the tendency of a compound to vaporize). Dissolved gases such as hydrogen sulfide can be present, as well as metal complexes, sulfur, and compounds of oxygen and nitrogen. Crude oils with low sulfur content are termed "sweet" because of the historical practice of tasting a small amount of oil to determine its quality. In contrast, "sour" crudes are those with higher sulfur content that have a more bitter taste and unpleasant smell. The composition of crude and the accompanying health risks can change rapidly following a release because of "weathering." Evaporation is a primary weathering process that can result in a significant reduction of volume during the first 24–48 hours after a release as components volatilize. The weathered crude oil does not contain many of the low-molecular-weight volatile chemicals of concern like benzene, toluene, ethylbenzene, and xylenes. Exposure to high levels of these compounds can cause irritation to the eyes and upper respiratory tract, and in some cases cause central nervous system depression. Many of these components have odor thresholds at levels below which adverse health effects are expected; therefore, the presence of a petrochemical odor does not necessarily indicate hazardous exposures. Monitoring of the air quality in the area surrounding the release is necessary to determine the presence or absence of any chemical hazard. Prolonged skin contact with liquid crude oil can result in irritation. Overall, crude oil has relatively low short-term toxicity.

Middle Distillates

The middle distillates include a wide variety of fuel oils, and their specific components, volatility, mobility, and toxicity will all vary to some degree. Responders should obtain safety data sheets for the specific products to determine the exact formulation involved. Most of the middle distillates have a relatively low volatility, and therefore the airborne concentrations do not typically reach significantly hazardous levels in the absence of heating or aerosol formation. Fuel oils tend to have only trace levels of the volatile compounds benzene, toluene, ethylbenzene, and xylene. Inhalation of sufficient fuel oil vapor can lead to various symptoms, including dizziness, headache, nausea, and vomiting. These symptoms are expected to pass quickly once exposure has ceased. The main hazard with these fuels is chemical pneumonitis following inhalation of aerosols or aspiration of vomit following ingestion. Prolonged skin contact with fuel oils can result in dermal irritation.

Gasoline and Petroleum Gas

Gasoline presents slightly higher health risks than do the middle distillate fuels. Gasoline can contain small amounts of benzene, toluene, and xylene. Gasoline is volatile, and therefore gasoline vapors can present both a health hazard and a flammability hazard. Gasoline odors are usually detected at a level that is not likely to cause any adverse health effects other than dizziness, headache, nausea, or vomiting. Eye, nose, and throat irritation start to occur at higher concentrations, and inhaling or swallowing large amounts of gasoline can cause death.

The primary hazards associated with petroleum gases relate to flammability and explosiveness. The principal components of LPG are propane, butane, and isobutane; however, it may also contain small amounts of ethane, pentane, and other gases. These chemicals can cause weak depressant effects on the central nervous system when they are present in high concentration, but they have practically no physiological effects under typical exposure conditions.

Natural gas is composed primarily of methane. It is a flammable gas that can act as a simple asphyxiant when present in concentrations high enough to create an oxygen-deficient atmosphere. Some sources of natural gas contain extremely high levels of hydrogen sulfide. Hydrogen sulfide presents a significant risk because it is a toxic, flammable, and corrosive gas that can be fatal even in very low concentrations. Methane has also been found dissolved in groundwater, but it can be present at levels considered safe. Testing is necessary to confirm whether the levels are acceptable.

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See Also: Chemical Risk; Hazardous Materials; Transportation Security.

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Policy Setting

Policy setting or policy formulation is the most critical phase in crisis management because it applies to all kinds of efforts of all stakeholders, including local, regional, national, and even international public and private entities. Policy setting includes not only planning and designing rules and roles of those entities but also implementing and sustaining the crisis management system effectively. Therefore, technical competency of crisis management policies is as important as their political approval.

The eightfold path of E. Bardach's policy analysis presents must-have steps in policy setting. The technical part of policy formulation involves creating efficient and implementable solutions to certainly and clearly addressed problems. Policy analysis steps should be fulfilled to complete these technical details. Identifying and analyzing the problem is the first step of policy setting. Crisis management policies can face a wide perspective of problems, from administration to fiscal issues. Hence, evaluating them carefully requires a range of various professions. Multistakeholder participation in the problem definition phase will help in understanding assorted issues and suggesting solutions at the same time. Public–public and public–private partnerships involving federal government agencies are the best application of modern public administration systems addressing the controversial topic of grassroots participation.

After defining problems, alternative solutions should be produced to offer policy makers different policy options. These options may include the status quo and other policy suggestions. Each suggestion must clearly define the players and their roles in policy. Having alternatives will help decision makers to explain new policy to the public, since the best alternative will be picked in the end. Therefore, alternatives should be as realistic as possible.

The most technical part of policy analysis is the criteria selection phase. A criterion is a scientific tool that reveals the quantified cost and benefit of a policy alternative. Although cost-benefit analysis is the most used criteria selection method, newer policies also utilize cost-effectiveness analysis. Effective costs mean weighted value analysis, which assumes that some criteria are more or less important than others. It makes sense since public policy issues are too complex to put in simple figures. However, policy makers should note that a criterion selected as the most cost-beneficial one in cost-benefit analysis could be a worse/better selection in cost-effectiveness analysis based on the statistical weights used.

Evaluating all alternatives with selected criteria, the most logical alternative is picked and explained to decision makers and society. Decision may be a scientific exercise for policy analysts; however, the public consequences of the suggested policy could create an unexpected resistance that could end with a political failure. Policy analysts should prepare the final submission of suggested policy for stakeholders, for politicians, and for the public. Technical terms may not create expected political support, although they can be very convincing statistically and scientifically. Telling, therefore, is an important phase because the open face of the policy is viewed from the angle of tellers. This does not mean that the tellers of the suggested policy should tell lies or hide facts from the society. The policy makers should clearly demonstrate all aspects of the new policy in a way understandable to all policy actors and to the public. Technology has made it easier for policy makers to promote and explain suggested policies. Internet and the media are policy makers' best friends against political failures if they are used carefully.

Once legislated, crisis management policies put many public and private organizations and persons into planning, implementing, and sustaining effective interactions during, after, and before extreme events. Guidance to those actors can be possible with agreed-upon negotiations. Those agreements should address duties and compensation of all actors.

Political Aspect

The political aspect of policy setting is not less noteworthy than the analytical part. Public approval of a crisis management policy is vital to sustain it. Continuation of policies across all phases of crisis management is as important as their delivery in the response phase. The largest part of the crisis management cycle belongs to the preparation and mitigation phases. Crisis management efforts are well spent during response and recovery, but a decrease in efforts in the other two, longer phases can cost numerous loss of lives and great material damage in a future disaster. In order to provide continuation, policy makers need to form a politically appropriate policy.

Many crisis management policies fail over time not because of technical details but because of political conditions. For example, crisis management policies in the United States were considered well designed until Hurricane Katrina in 2005. Hurricane Katrina was not the first hurricane to hit the United States or its southern coasts; Louisiana, Florida, Texas, and other southern states have been targets of other extreme weather events for over a hundred years. Moreover, U.S. crisis management policies were reformed and strengthened both locally and nationally after the 9/11 attacks. The initial response to Hurricane Katrina was also successful; the president declared a state of emergency on August 27, two days before the hurricane made landfall. Despite the common belief that a dispute between federal and state governments brought about failure in response efforts, the reality was that the infrastructure was not designed well enough to protect New Orleans residents. Policy makers did not follow mitigation protocols carefully enough, which resulted in deaths during the hurricane.

In other words, policy makers waited for another crisis instead of preparing the community for it. Crisis management policies created only after new crises are called "disaster-driven policies." Underdeveloped countries generally apply disaster-driven legislation because public opinion is generally not focused on specific issues, even though those issues are vitally important for the community. However, events like Hurricane Katrina, the Tohoku earthquake and tsunami in 2011, and the Deepwater Horizon oil spill in the Gulf of Mexico in 2010 demonstrate that problematic disaster-driven policies are not only applied in underdeveloped countries. The political side of policy setting is crucial for this exact reason: crisis management policies are worthless in any situation of discontinuation. The policy could excel analytically in terms of improvising intra-training programs; real-time exercises; personnel; budget; and intraorganizational, interorganizational, and even international roles and duties; nonetheless, a pause or an interruption in policy process because of a lack of political support may end in total failure.

Political formulation of a policy begins with a democratic decision-making setting. Authorization of the policy should include legitimate partners of decision makers. Democratic legitimacy can primarily come to reality with elections; however, other legitimate authorities could be created in different forms such as charismatic, traditional ones. Traditional authorities are the most common decision-making mechanisms around the world because the systems include membership of both elected and appointed officials. Appointed bureaucrats take their authority from long-time customs.

Charismatic leadership forms a different kind of legitimacy when a single person or a group possesses or is believed to possess supernatural personal attributes. Although almost no governments run on this type of legitimacy any more, some leaders can still influence public policies with their charisma in traditional or legal authority systems. However, considering that crisis management policies take years to put into effect and usually should last more than a life span, a policy promoted by a person's charisma—no matter how strong it is—will be unsuccessful in the long term.

Legitimacy of a specific crisis management policy thus should be continuous. Traditional and legal legitimacy sources could provide this kind of consistency for a long crisis management process. Bringing all stakeholders into the decision-making process is a must for political legitimacy and consistency of the policies in the long term. This is another problem, since stakeholders may have different opinions about public policies. Their individual roles and compensation are other important issues that actually could tear down the whole network before even starting it. Negotiation with public- and private-sector organizations together is an art itself.

R. Fisher, W. Ury, and B. Patton (1991) provided valuable insight for this very subject in their influential book titled *Getting to YES*. Traditional negotiation tactics may not work in the modern world because technology and communication have forced private and public organizations to review all their interactions with the environment. Crisis management policies, especially when they are set up at a national or international level, are commonly steered by public organizations. They tend to lead the whole network because of traditional understanding, where government is the sole source of authority and power. However, the postmodern world of ours requires governance as

On January 28, 2008, President Barack Obama signs emergency declarations for the state of Arkansas and the commonwealth of Kentucky after requests for aid from both state governors. Severe winter storms began pummeling the region on January 26. Federal policy dictates that a presidential declaration is necessary to authorize the Department of Homeland Security and the Federal Emergency Management Agency to coordinate all disaster relief efforts in a specified emergency.

a communication method among all public and private entities about almost any common policy, including crisis management. Therefore, policy makers should utilize the best negotiation tactics to reach participants.

Crisis management policies are vastly different from some other public policies in context; they are generally mutual and can involve obligations for partners. A one-size-fits-all approach is not enough for the partners, so the negotiator agency should seek different settlement options for different partners' concerns. It is obvious that local, regional, and national governments; nongovernmental organizations (NGOs); private companies; and civil society will have different roles during a crisis. The position of an entity in a crisis management network entirely changes the duties executed. Coordinating agencies may set up individual types of relationships with organizations in order to increase effectiveness of performed activities.

Agencies in crisis management should be approached differently because of their individual attributes. For example, a central government agency could use a more directive language toward a local or regional governmental entity. It could be necessary to do so when an immediate action is needed by the closest authority, particularly in response and recovery phases. Nonetheless, a directive order could be unsuitable for nongovernmental agencies. For instance, many crisis management systems throughout the world use an emergency communication plan where all cell phone users in a particular region except first responders are blocked by mobile network operators immediately after a national emergency declaration. London police performed a similar operation during the July 7, 2005, train bombings in London. In observing lessons learned from the bombings, K. Strom and J. Eyerman stated that the system was helpful for first responders, with a few ignorable and fixable flaws. The most important part of this particular prevention system is the cellular network companies. It should be noted that the richest and most powerful companies will need more than a direct government command to provide political commitment to such kinds of regulations. Negotiation and persuasion methods instead of command-and-control techniques are what the coordinator agencies of crisis management will need, especially for private companies, nonprofit organizations, and civilians.

Conclusion

Policy setting defines courses of action to achieve the policy agenda, which is shaped by analytical and political factors. The crisis management agenda requires commitments of almost all public and private organizational actors in the community. Therefore, an effective policy should have a well-judged analysis with rational alternatives. All stakeholders should clearly grasp their possible roles and responsibilities. The wording of the policy legislation needs articulation in context. These analytical details will help a policy maintain its reliability during extreme events. Commitment of stakeholders also requires political feasibility of the policy suggested. Legitimacy of the legislation authority is a necessity for political convenience. Traditional and democratic authorities are better than other authorities, which take advantage of charisma or other supernatural sources in the long run. Crisis management policies include mitigation and preparation phases that could take more than several decades; therefore, a long-running legitimacy is vital for political commitment of all stakeholders of the policy. To sum up, both analytical and political aspects of policy setting are equally critical for crisis management.

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See Also: Decision Making, Theories of; Political and Organizational Leadership; Stakeholders.

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Political and Organizational Leadership

Organizational leadership is defined as "the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organizations of which they are members," according to Robert House et al. Leadership, as a general concept, is defined by Dean Keith Simonton as "an attribute of a group member whose influence on group attitudes, performance, or decision making greatly exceeds that of the average member of the group." Combining these two definitions, organizational leadership could be described as the influence of a leader on the organization and its employees to motivate for success and better performance.

Political and organizational leaders play their most crucial role in times of crisis. In the event of a crisis—political and economic crises, in particular—strong leadership is needed for big, transformative, or substantive change. This change is essential for the continuance, and even for the survival, of organizations and countries. Evaluating crisis conditions, predicting future changes, developing the right strategies, and implementing the right course of action are of vital importance for organizations and countries.

Essentials of Organizational Leadership

Stephen Zaccaro and Richard Klimoski summarize the essentials of organizational leadership as follows:

- Organizational leadership influences employees and organizations and provides

direction and strategy for attaining objectives.
- Leadership is affected by organization types, organization characteristics, and environment.
- Organizational leadership creates influence on the organizational life, especially through use of nonroutine activities.

Personal characteristics of successful organizational leaders have been much discussed among scholars. The most common attributes of leaders were grouped under three categories: power, affiliation, and achievement.

Power motive is defined as a desire to obtain status and have an impact on others, hence affecting their behaviors and emotions. Actually, possessing a certain amount of power is regarded as the most essential aspect of leadership. This power is utilized to gain and use social and managerial influence on the workers to get things done. Leaders use this power to motivate employees and to increase their commitment level.

On the other hand, leaders with a strong power motive commonly have an authoritarian character. They favor people who will be devoted to them and easily managed. Moreover, they are assertive, overbearing, and less cooperative, hardly showing desire to gain favor of subordinates.

Another attribute of leaders is their personal characteristics and behavior as perceived by their staffs. This is called "affiliation" of a leader. Affiliation is defined as "a desire to establish, maintain, and restore personal and emotional relationships with others." Leaders with a strong affiliation motive seek participation of employees. Friendship, integration, and participation are important for this kind of leader. On the other hand, leaders with a strong affiliation motive are likely to be less assertive and more permissive. They may overvalue the approval of others. Moreover, they may not take necessary actions for the organization in order to maintain good relationships around themselves.

The achievement motive is defined as "a desire to exceed some standard of excellence or do something distinctive." Leaders with a high achievement motive are perfectionists. They actively take part in organizational activities. They have the capacity for innovation, proactivity, and an enterprising nature.

Regardless of the group, other skills also are regarded as essentials of organizational leaders.

First, complex information-processing and problem-solving capacities are essential cognitive characteristics of organizational leaders. Factors affecting organizations are interconnected and complex in today's world. Advances in information technology, globalization, and speed of data flow necessitate information-processing skills. Interpreting available information and developing the right strategies requires problem-solving abilities.

Second, top executives need to coordinate and oversee the activities of all of the units within the organization. Therefore, leaders need to have social skills that will help balance conflicting demands and goals for the good of the organization. This ability to collaborate with different units is important to manage the outside environments of the organization.

Third, for high-level organizational leaders, it is necessary to take into account the environment in which the organization operates. Organizations need to build and maintain coalitions and partnerships with others. To be able to create these coalitions, organization leaders may need to be more cooperative, because creating partnerships requires more persuasion.

Fourth, leaders and executives need to be aware of available technologies and to use them effectively. Technological developments create both advantages and disadvantages for organizational leaders in today's world. Available hardware and software dramatically affect the management of organizations. However, during crisis, being highly dependent on technology may pose threats, such as not being able to access available resources because of the lack of operational computer systems. Organizational leaders need to plan alternative methods in advance to prevent the organization from possible harms of technology, which is highly useful otherwise.

All these attributes are associated with success. Some other factors are regarded as reasons for failure. Organizational leaders may fail, and commonly, organizations fail (totally or to some extent) if their leaders fail. Lack of leadership skills such as establishing good teamwork, inability to lead change, and lack of interpersonal skills such as creating good relationships and

Case Study: Apple, Inc., and Steve Jobs

Steve Jobs is one of the best successful leadership examples. His life involved almost every aspect of a successful organizational leader. When there was a big economic crisis in Apple in 1997, he managed to rescue the firm from bankruptcy and then created the most valuable company in the following decade.

Jobs founded Apple in 1976 with his friends. He was forced to leave his own company in 1987. In the following 10 years, until 1997, Apple continually lost market share. The company had a three-year record-low stock price and huge financial losses. In order to recover from a total failure, the company decided to bring back Steve Jobs as chief executive officer (CEO).

After he was appointed Apple's CEO for the second time, in 1997, Steve Jobs made several radical changes. George Beahm summarizes the philosophy of Jobs and defined the causes of crisis that Apple faced as follows:

> You need a very product-oriented culture, even in a technology company. Lots of companies have tons of great engineers and smart people. But ultimately, there needs to be some gravitational force that pulls it all together. Otherwise, you can get great pieces of technology all floating around the universe. But it doesn't add up to much.

Realizing this situation, Jobs narrowed Apple's product portfolio down to a few, choosing simple but useful products according to market needs. He changed the focus of Apple from easy-to-use computers to a digital lifestyle line of products, including hardware, operating systems, and software for computers, cellular phones, and MP3 players. Jobs describes his policy as follows:

> People think focus means saying yes to the thing you've got to focus on. But that's not what it means at all. It means saying no to the hundreds of other good ideas that there are. You have to pick carefully. I'm actually as proud of the things we haven't done as the things I have done. Innovation is saying no to 1,000 things.

He put a special emphasize on the design of the products. According to him, design was not how it looks but it was how it works. Therefore, he worked with the best designers in the creation of new products.

He used empathy to find out what customers want. He said, "We figure out what we want." He created good products that he himself would like to use. He thought customers would like the products if he liked them first. Time showed that he was right.

Jobs valued innovation. He rewarded employees who showed experimentation, risk taking, and creativity. For example, when developing the iPhone, he became involved in a big debate within Apple with others. He said this:

> It was a great challenge. Let's make a great phone that we fall in love with. And we've got the technology. We've got the miniaturization from the iPod. We've got the sophisticated operating system from Mac. Nobody had ever thought about putting operating systems as sophisticated as OS X inside a phone, so that was a real question. We had a big debate inside the company whether we could do that or not. And that was one where I had to adjudicate it and just say, "We're going to do it. Let's try." The smartest software guys were saying they can do it, so let's give them a shot. And they did.

Steve Jobs was very demanding while recruiting new employees. Intelligence and dependence on the work and company was very important. He believed that recruiting the right people was the magic rule for success.

After recruitment, socialization of employees around the Apple culture was a continual process. Employees were surrounded by others as qualified as themselves. This forced them to prove their abilities. He defined his role for employees as follows:

> My job is to not to be easy on people. My job is to make them better. My job is to pull things together, clear the ways, get resources

for key projects, and make these great people even better.

Steve Jobs was known as an outspoken person. He was authoritarian, dominant, and assertive, like most powerful leaders. He is described by employees as temperamental, aggressive, tough, intimidating, and very demanding. In case of failure, he admonished verbally. However, successful personnel were rewarded generously. Even the employees who feared him had great respect for him because of inspired loyalty, enthusiasm, and the high level of continuous innovation. Actually, leaders with great power are associated with these kinds of attitudes. Steve Jobs benefited from these attitudes to produce creative vision and led this vision to innovation.

He also showed almost every aspect of achievement motive, such as being a perfectionist, taking part in organizational activities, and seeking innovation. He created a good teamwork culture in Apple. He analyzed the environment very well and developed his strategy based on the future environment.

To sum up, leaders are supposed to find and fix whatever part of the organization is not properly working. Leaders analyze the strengths, threats, and weaknesses of organizations and find existing gaps that prevent the organization from achieving its goals. Steve Jobs carried out this duty perfectly for Apple.

As a result of all the efforts of Steve Jobs and his strong leadership skills, Apple survived after bankruptcy. Between early 2003 and 2006, the price of Apple's stock increased more than tenfold. Apple products have sold in the millions all over the world. Finally, Apple became the most valuable company in 2012.

communication are among the major reasons for leadership failure.

Leadership Roles in Organizations

The most essential role of a leader is to improve organizational and collective effectiveness. Practical evidence shows that "top executives matter" in overall effectiveness of organizations. There are several ways in which a leader affects organizations.

First, characteristics of leaders affect organizations. Leaders define the path and direction in which the organization will operate. All members try to reach organizational goals defined by leaders. Leaders carry out this duty by defining the mission, vision, strategy, goals, plans, and tasks of organizations. In doing so, leaders provide a sense of understanding and guidance for the overall activities of the organization.

Second, leaders matter because they are supposed to find and fix whatever part of the organization is not working properly. This part could be a person, a division, or the organization as a whole. Leaders analyze the strengths, threats, and weaknesses of the organization; they find out and fix existing problems that prevent organizations from attaining their goals.

If the current structure of an organization is regarded as the source of problems, leaders must have a full understanding of redesigning that organization. A constantly changing environment forces organizations to change, even those that operate in a very closed system. Traditionally, organizations have hierarchical structures. Considering today's business environment and complex problems, a major role of leaders is to create effective partnerships with other leaders and organizations. This is the basic assumption behind the strategic management approach. Strategic management and leadership, along with the transformational leadership approach, provide good insight for organizational leadership.

Crisis Management

Organizational and political leadership is most needed during times of crisis—leadership is not needed or noticed deeply in the regular course of activities of organizations, according to Zaccaro and Klimoski. However, in a nonroutine activity or an unforeseen situation, leadership becomes highly important. The essence of organizational leadership is to be influential over and above routine activities.

Nonroutine activity is defined "as any situation that creates a potential or actual threat to organizational goal progress." During these periods, organizational leaders actively use their problem-solving skills. They analyze causes of organizational problems, determine potential solutions, develop and implement strategies to achieve solutions, and monitor implementation of developed strategies.

Despite the crucial role of organizational leaders in crisis, leaders' main responsibility is to anticipate and be prepared for such tough times. Crisis may stem from organizational internal factors, environmental external factors, or a mixture of these two. In terms of organizational factors, organizational activities designed according to detailed and specified rules commonly do not require leaders' intervention. The role of leaders here is to evaluate these activities and to try to find possible problematic gaps. In order to be able to predict future problems, leaders must criticize and evaluate routine activities of their organizations. When dealing with known and noticed problems, leaders only need to practice their past experience to solve these problems. However, defining unknown or still-not-emergent problems needs more work and continuing system evaluation. During this evaluation process, leaders must construct the nature of the problem and potential solution strategies.

When it comes to selection among available intervention strategies, leaders are supposed to choose the appropriate strategy based on their discretion and past experience. In terms of environment, leaders must be aware of the changes in the environment, have the ability to analyze these events and their possible effects on the organization, and make necessary plans to confront these threats. A leader can possess all of these skills; however, assembling a group of experts and acting together is always more reliable than personal decision making.

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See Also: Collaboration; Command and Control; Coordination; Criticality Assessment; Decision Making; Decision Making Under Stress; Emergency Management, Principles of; Emergency Management Systems; Operational Plans; Organizational Failure; Policy Setting; Pre-Crisis Training and Planning; Pre-Impact Planning Process; Public Relations; Resource Management; Risk Analysis; Risk Assessment; Risk Treatment; Strategic Plans; Threat Detection; Uncertainty.

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Post-Traumatic Stress Disorder

Stress is a state of mental or emotional strain. Eustress helps people remain alert and facilitates their reactions to demanding situations. Distress involves psychological impairment, which is usually a temporary condition. Post-traumatic stress disorder (PTSD) is a negative psychological reaction through which a person tries to come to terms with a recent event that has severely affected him or her. A subset of PTSD is critical incident stress (CIS), which occurs in frontline emergency workers who experience frightening, horrifying, or otherwise dramatic conditions. CIS is not limited to emergency workers; indeed, some of them escape its consequences by being able to concentrate wholly on their work. In this context, a critical incident or traumatic event is an occurrence that is outside the range of usual human experience and has a strong potential to overwhelm a person's normal ability to cope with stress. If the impact is abrupt, the first reaction may be shock, a sudden and often intense disturbance of a person's emotional state that leaves the subject feeling stunned or dazed. Shock may be followed by stress disturbance that lasts for weeks, months, or even years. In some of the worst cases, an early reaction is denial, which can be manifest as failure to acknowledge that something very stressful has happened or failure to experience the full intensity of the event. Denial is a psychological self-protective mechanism but not a very healthy one, given that it can retard the mental process of recovery from a critical incident.

As it arises from many different situations, PTSD is a common phenomenon. In Western countries, it may be prevalent in about 1 percent of the general population, and about 10 percent will have had some experience of it during their lifetimes to date. Studies of emergency workers have revealed rates that vary between 3 and 40 percent, while soldiers returning from the battlefield and prisoners of war have shown prevalence rates of up to 65 percent. Studies of the military causes of PTSD during and after World War I revealed how disorientating, profound, and persistent it can be. Battlefield causes apart, PTSD is chronic or recurrent in a high proportion of people who develop it.

Symptoms of PTSD

PTSD has many contributory symptoms. They can be classified into four groups, as follows:

Physical symptoms include nausea, trembling, chills or profuse sweating, chest pains, racing heartbeat, high blood pressure, muscle aches, sleep disturbances, and lassitude.

Intellectual symptoms include confusion or disorientation, loss of memory (psychogenic amnesia), difficulty making decisions or solving problems, difficulty concentrating and calculating, reliving the event over and over again (a symptom known as "intrusion"), distressing and recurrent dreams about the causative event, hallucinations or illusions, and reduced attention span.

Behavioral symptoms include drug or alcohol abuse, excessive checking and securing, being extremely protective of (or fearful for) the safety of loved ones, angry outbursts, crying spells, withdrawal from social contact, suspiciousness, increased or decreased food intake, propensity to be easily startled, and avoidance or fear of stimuli that resemble the one that created the stress.

Emotional symptoms include anxiety, fear, guilt, depression, sadness, grief, despair, resentment, irritability, anger, sense of abandonment, numbness, shock, intense distress at seeing anything that is judged symbolic of the traumatic event (including anniversaries), inability to experience loving feelings (emotional flatness), viewing the future as foreshortened, and violent mood swings.

Clearly, there is overlap between the categories, and symptoms tend to be multiple, not single. Moreover, virtually all the symptoms listed are associated with other forms of disturbance, not exclusively with PTSD. Diagnosis therefore requires a clear understanding of the cause-effect relationship and how the symptoms combine to reveal the disorder in a patient's personality. The symptoms of PTSD may occur immediately, soon after the incident, or be delayed up to a year. If they start more than six months after the event, this is called "delayed-onset PTSD." Patients who are suffering from latent or manifest stress disorder are more susceptible than normal to accidents and physical illnesses.

PTSD is most likely to occur when a person is subject to a negative experience that he or she is not trained or otherwise prepared to cope with. The sight of much death and destruction, the experience of violence, the injury of colleagues or family members, hazardous living or working conditions, the combination of threat and uncertainty, and excessive physical or emotional demands on a person can all trigger PTSD, especially when such problems occur together, rather than singly. Among emergency workers, both the demands of the job and any psychological and practical training received can help inoculate the subject against stress disorder. However, some events are so overwhelming that there is little a person can do to ward off the psychological impact. Nevertheless, people who receive serious physical injuries may escape PTSD by lapsing into a coma or being otherwise unaware of the psychological implications of the event.

Strong emotional or stress reactions are common after a critical incident, although their severity and duration may vary considerably from one person to another. Psychologically healthy people survive such troubles through their self-healing mechanisms and the fact that their relationship with the physical, social, and emotional milieu in which they live can survive the impact of the negative event. However, the support of loved ones, close friends, or professional counselors may be needed in order to create the conditions for recovery and prevent disorders from becoming chronic.

Psychologists have a choice of several scales on which to measure traumatic stress. The Davidson trauma scale (DTS) is designed to evaluate PTSD in people who have experienced extreme events. It uses 17 measures of the frequency and seriousness of symptoms. It can record changes over time, for example, when comparing different methods of treatment. The psychological general well-being index (PGWBI) is a bipolar scale that uses 22 measures to assess both negative and positive psychological states, including well-being resulting from lack of stress. It has six dimensions: anxiety, depression, positive attitudes and well-being, self-control, general well-being, and vitality. Finally, the dispositional resilience scale (DRS) measures the capacity of a person to resist stressful events. It takes into

A U.S. Army soldier gives a young Pakistani girl a drink of water as they are airlifted aboard a helicopter from Muzaffarabad to Islamabad, Pakistan, after a devastating earthquake, October 19, 2005. A victim of this crisis might experience post-traumatic stress disorder (PTSD), a negative psychological reaction brought on by trying to come to terms with a disturbing recent event. A subset of PTSD is critical incident stress, which occurs in frontline emergency workers; however, some escape it by concentrating fully on the work at hand.

account hardiness, the ability to transform adverse events into opportunities, understanding their significance, and regaining control. It utilizes 18 psychological categories and various social ones.

Recovery From PTSD

When a person is affected by PTSD, the length of time required to recover depends on several factors. The first of these is the intensity of the event, as conceptualized in terms of its duration, the intensity of the experience, and the number of casualties or amount of destruction observed. Previous experience of similar situations can prepare a person for the trauma and reduce its impact. However, sequences of stressful events may increase the psychological burden and therefore the recovery time. For example, people who live in alpine valleys may have a well-developed fear of snow and ice avalanches. A series of seasons in which the incidence of avalanches is higher than normal may exacerbate stress disorders.

A person who suffers from PTSD or CIS will probably need a support mechanism. Studies of the psychological impact of terrorist outrages suggest that people overwhelmingly prefer to seek support from friends and family, not professional carers such as psychiatrists and trained counselors. However, the remediation of PTSD can be a very delicate matter, and misguided attempts may worsen the problem. Nevertheless, a patient should be encouraged and helped to overcome PTSD, and to express his or her feelings in therapeutic rather than damaging ways. This will probably require helping the patient to revisit the event in order to come to terms with it. The support of family members and carers will doubtless be vitally important, and the patient should be encouraged to maintain a healthy diet, get enough rest, and drive or operate machinery carefully.

Psychiatric help or counseling is needed when feelings or physical symptoms are unbearably intense, or when the symptoms continue for too long. It is especially necessary when the patient has no one with whom to share his or her emotions, or when there is a negative impact on relationships at work and at home. Help is needed if the individual turns to substance abuse, if his or her behavior causes concern, or if he or she suffers a mental or emotional breakdown. The problem cannot usually be solved with antidepressant medicines, but these may help relieve symptoms (especially intrusive ones) and may enable a patient to participate more effectively in psychotherapy.

When a PTSD sufferer seeks professional help, there may be several options. Behavior therapy aims to correct harmful patterns of behavior and thought by teaching relaxation and the ability to challenge negative mental processes. Psychodynamic psychotherapy helps the patient to examine his or her values and experience of the traumatic event. Family therapy is useful when a person's spouse and children are affected by his or her symptoms and behavior. Finally, discussion groups and peer-counseling groups can help the survivors of traumatic events to share their experiences and reactions. They can create a sense of solidarity and support. However, uncontrolled situations and ill-advised choices in therapy can open a Pandora's box of harmful reactions that can worsen a patient's condition rather than heal it.

The Mitchell Method of Debriefing

Group therapy is mostly used to help emergency responders after they have been involved in critical incidents. Critical incident defusing is conducted directly after an incident by a trained counselor or psychiatrist. Critical incident debriefing should follow within 72 hours. Psychological debriefing (which is not to be confused with debriefing for technical and operational reasons) has several justifications. It helps review the impact of the critical event on a person's life. Emotions can be vented and reassurance and support provided. Participants learn about trauma reactions and how to manage symptoms. The sessions can help people to return to normal, create a sense of group solidarity, and identify any individuals who are so badly affected that they need additional counseling. Above all, participants are encouraged to realize that deep emotional and psychological reactions to critical incidents are normal and that a healing process can be started by sharing reactions with colleagues.

The best-known among several methods of critical incident stress debriefing is that devised by Jeffrey T. Mitchell and his colleagues. It has seven stages. The first of these is introductory, in which the structure of the debriefing process is explained to participants and agreements on confidentiality and other matters are established. When a team is debriefed, all its members need to be present at the sittings and there must be a professional debriefer, who will probably be a psychiatrist or trained counselor.

The second phase involves using narratives from group members to establish exactly what happened during the critical incident. Each participant must contribute to the discussion, and participants are encouraged to develop a sense of bonding. In third place comes the thought (or thought reaction) phase, in which participants discuss their personal views of the incident. This is followed by the reaction (or emotional reaction) phase, in which the facilitator seeks to bring people's feelings about the incident to the surface. Reactions must be legitimized and not made to seem abnormal. In the fifth phase, participants are encouraged to discuss their physical symptoms and to realize that these are normal—in fact, they are predictable reactions to an abnormal situation.

The sixth phase is one in which practicalities are discussed. Information on common or likely stress reactions is shared with the participants, and practical guidance is offered on how to deal with them. Finally, the reentry phase is used to summarize the results of the debriefing, distribute informational material, and, where necessary, schedule a follow-up debriefing session. Afterward, the debriefer should remain available to discuss issues privately with any member of the group who requires further help. In the case of multiple debriefings, their facilitators should confer, of course without breaching confidentiality agreements.

Conclusion

Post-traumatic stress disorder and its subset critical incident stress are common conditions that may affect anyone who is involved in a sudden, traumatic event. The stress reactions may manifest themselves immediately or with a delay of up to one year. A range of physical, intellectual, behavioral, and emotional symptoms may indicate that victims of PTSD need counseling and support. Although in many countries professional psychological help is readily available, most individual sufferers prefer to seek support from friends and family. Groups of emergency responders who have experienced critical incident stress may undergo group therapy debriefing sessions. These have been found to be useful in legitimizing reactions to abnormal situations. However, not all emergency services agree with such methods, especially as debriefing that goes wrong can exacerbate tensions and symptoms and increase the effects of PTSD.

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See Also: Debriefing; Disruption of Organizations; Emergency Responders; Groupthink; Incident Response; Mental Illness; Mental Models; Normalization of Deviance; Panic, Nature and Conditions of; Trauma.

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Poverty

Despite the widespread public use of the term *poverty*, many experts disagree about a clear and specific definition of the term. For the purposes of this article, poverty is a subjective measure by which an individual's or group's income level, standard of living, or access to resources are measured against those of other individuals or groups and found lacking, causing problems in daily life and long-term survival. It is a situation of need or lacking where affected individuals need more or better resources or are lacking in certain resources that would make their lives safer, healthier, easier, or better. Because income, standard of living, and resources (and access to them) vary widely from location to location, poverty levels must be considered relative to the specific area they occur in, whether at a group, local, state, regional, or national level. Although considering poverty within these specific contexts can create complications for crisis management, it is important that crisis managers consider it in these terms to provide more effective disaster, emergency, and crisis response.

Poverty creates specific problems for people that need to be dealt with by crisis management in times of disasters, emergencies, and crises, as it often puts people at greater risk and makes them especially vulnerable to such events. This need is complicated by the fact that poverty does not have the same effects on all populations, even in crises, making responses inclusive of needs related to poverty more complicated. Crisis management must account for and accommodate poverty and related needs when responding to disasters, emergencies, and crises but cannot apply the same set of parameters to each population or event.

Although poverty typically predates a moment of crisis, its presence changes the effects of crises and the crises, in turn, often exacerbate poverty. Because of this, some experts have suggested that the best approach to vulnerability reduction and, ultimately, crisis management is the elimination of poverty through long-term projects aimed at increasing incomes and standards of living, as well as improving access to critical resources. People who live at or below the poverty mark in a society (and some who live above it, but still at lower income levels) often lack resources to prepare for or respond to a crisis on their own and are at greater risk from threats and hazards. They likely lack the financial resources to suitably prepare for a disaster, recover from an emergency, or respond to a crisis. Such vulnerable populations are especially susceptible where social safety nets are absent. Moreover, this problem of vulnerability is further complicated for people living in poverty because they often exist in multiple vulnerable populations. Internationally, many elderly and children, women, and disabled individuals live in poverty, each characteristic (age, gender, sex, disability, and poverty) potentially placing them in an even more vulnerable situation than they would be otherwise.

Data collected in times outside moments of crisis can help prepare individuals and people involved with crisis management to support populations that live in poverty. Identifying areas of and groups that live in high poverty can help identify potentially vulnerable populations. With this identification, crisis management plans can account for particular needs that may be greater in poverty-ridden populations than they are among the general population. In addition to fewer financial resources, poverty is often correlated with a wide range of issues that can themselves cause problems in terms of crisis management. Although poverty often correlates with these problems, it is important to note that they are not all necessarily present in the same way in the same areas, so managing crises can be made more difficult without knowledge of the area affected.

People in poverty often live with less access to medical care and more health problems. They have less access to education and job training and face less stable and financially secure employment. They struggle with inadequate food and water sources. Many live in substandard conditions or lack shelter. Areas with high poverty rates also often deal with higher crime rates. All of these factors themselves typically predate a crisis and are often made worse by the conditions that can exist on the ground after a crisis, emergency, or disaster, as demonstrated by many crises, emergencies, and disasters such as how health problems faced by the poor in New Orleans, Louisiana, were exacerbated after Hurricane Katrina with even less available medical care. Because of these factors, crisis management efforts must contend with a population that is potentially not only affected by the crisis but also unprepared to deal with or recover from it, even compared to other members of the population who may also be struggling.

Crisis management that does not account for the circumstances in which poorer populations live can exacerbate poverty and other related problems. After the 2004 tsunami in India and Sri Lanka, lower-income residents who had lived near the water found themselves resettled farther inland. Despite the often newly built homes, residents found themselves farther from the water they relied on for their livelihood. As Nandini Gunewardena has written, these residents lacked financial and business resources that would have helped them recover from the disaster. As he and others have studied, this was made worse by discussion of and the dislocation of residents from their livelihoods and the associated social conflicts that arose from new homes and differing resources.

Economic and financial crises in particular can cause poverty. Some also consider poverty itself to be a crisis, one that needs to be managed like other crises, disasters, and emergencies are managed. Discussions of these situations often overlap with consideration of other crises, especially economic and financial crises. In such situations, people already living below the poverty level may find themselves with even lower income levels and people who were previously better off financially may find themselves falling below the poverty line. The economic crisis in Russia in the mid-to-late 1990s (reaching a critical point in 1998), for example, caused massive job loss from closed factories and farms and pushed millions of Russians into poverty.

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See Also: Income Inequality and Labor Unrest; Losses, Quantitative Versus Qualitative; Resiliency; Vulnerability; Vulnerable Populations.

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Practical Drift

The combined knowledge gained by both emergency planners and emergency responders is critical to the successful management of emergencies. Each group cannot operate to its full capacity without the other group's knowledge and experience. However, a disconnection often develops between formal emergency plans and local implementation. The theory of practical drift was developed to explain this phenomenon. Crisis situations and poor emergency response are in part attributable to systemic problems such as practical drift. The challenging environment of emergency situations will exacerbate the knowledge gap between safety planners and workers or emergency planners and responders if steps are not taken to reduce practical drift. Practical drift must be avoided if the victims of emergencies are to best benefit from the shared knowledge of emergency planners and responders.

Corporate Safety and Crisis Management

Colonel Scott Snook coined the term *practical drift* in 2000 in his book *Friendly Fire*, an analysis of the causes of an incident that occurred during the Iraq War in 1994. Two U.S. Army Black Hawk helicopters were accidentally shot down by friendly fire from two U.S. Air Force F-15C Eagle fighter jets in the no-fly zone over northern Iraq, killing 26 members of an international peacekeeping mission. Snook developed the theory of practical drift to explain how local practices tend to slowly drift away from established written standard procedures when those standards do not seem to practically fit the situation at hand, whether it be a routine task or an emergency situation. Practical drift can be found in a variety of companies and fields, including that of crisis management.

Snook's theory identifies situational coupling, logics of action, and time as critical factors influencing practical drift. First, practical drift can be affected by whether an organization is loosely or tightly coupled, meaning whether an organization's different units have a higher or lower degree of local autonomy in decision making. The second critical factor, logics of action, incorporates the opposing practices of operating based on formal guidelines, usually handed down from the top of the organizational hierarchy, and operating based on local decisions based on the task and situation at hand. Such informal localized practices are more likely to develop when workers feel the formal corporate guidelines do not match their situational reality or needs, such as safety or productivity requirements. Local workers and units can shift between the two forms of operation over time.

Finally, an organization's stability can change because of the critical factor of time, which can encourage or reinforce the emergence of practical drift. In a loosely coupled organization, practical drift that has set in over time may go unnoticed until a crisis emerges. Response to the crisis requires tighter coupling, as units must work together. Each unit will expect the other to operate according to the formal crisis management plan or safety guidelines, even if they themselves have been using localized practices. Practical drift in routine operations thus silently sets the stage over time for poor response in times of crisis. Organizations with more stringent, less flexible procedures are more vulnerable to practical drift caused by adaptation to localized conditions over time.

Practical Drift in Emergency Management

One of the root causes of practical drift in crisis management is the existing knowledge gap between the emergency planners who develop written emergency response procedures and the emergency responders who implement them. Emergencies often occur without warning, are unpredictable, and create dangerous situations. It is in these challenging conditions that emergency responders must apply both their long-term knowledge of formal emergency procedures and their ongoing knowledge of local conditions. The larger the emergency, the more intensive the required response, especially when multiagency response must be coordinated. Finally, planners must account for an emergency situation's potential to escalate and overwhelm local or state resources, creating contingencies for larger emergency response as a crisis unfolds.

Practical drift encompasses the changeable, localized conditions present in most emergencies that can disrupt even the most elaborate and well-crafted response plans. These conditions can change during the course of an emergency as well as between different emergencies, even if they are of the same nature. These localized conditions can make it impossible or impractical for emergency responders to adhere to preexisting emergency response plans, forcing adaptations that may evolve into informal practices over time.

Emergency planners conduct extensive research, analysis, testing, and reflection over time to develop emergency response plans. Planners must consider the types of emergencies likely to occur and make educated guesses as to likely primary and secondary impacts. Planners must work collectively to incorporate a variety of expertise in a variety of fields. Sources consulted can include manuals, simulations and field exercises, meetings and conferences, focus groups and task forces, design reviews, examination of past incident responses, and personal experiences.

Emergency planners must also evaluate the level and capabilities of the resources available to emergency responders as well as any constraints and plan for larger emergencies that require multiagency responses and the establishment of chains of command and control. For example, localized emergencies may require less resources, and rural, volunteer responders will generally have less resources, finances, and equipment at their disposal than their urban or professional counterparts. Emergency planners thus need to be familiar with localized experiences and conditions.

Although emergency planners have time to develop their plans, emergency responders must quickly put them into action in complex and challenging situations to minimize damage and loss of life. Emergency responders rely not just on emergency plans but also on personal experience and knowledge of local conditions. Resources needed for effective response include personnel, equipment, supplies, and procedures. Emergency responders must coordinate their knowledge of emergency plans with their knowledge of local situations and practices to operate most effectively. They must also do so in a timely and efficient manner.

Emergency responders have exposure to formal plans and procedures through meetings, handbooks, and field exercises but are rarely involved in the development, evaluation, and evolution of such plans. The fraternal nature and strong trust between police and firefighters can strengthen the already present tendency toward localization of practices. Practical drift furthers this disconnection between the two groups, preventing emergency responders from gaining the full benefits of collective planning-based knowledge. It also prevents planners from fully benefiting from the up-to-date knowledge responders gain during the actual implementation of emergency procedures.

The poor communication and lack of knowledge sharing that foster practical drift hinders interagency cooperation and increases inefficiency, making emergency situations more dangerous. Practical drift is both more likely and potentially more dangerous in emergencies involving multiagency response. In these situations, each agency must not only abandon localized practices but also abandon its agency-based emergency plan for a new, global plan.

Practical drift affects emergency response in the long term as these adaptive localized practices evolve, becoming ingrained into informal local procedures. Emergency planners are generally unaware of these local procedures, as most go unrecorded. Thus, local changes fail to become incorporated into formal plans, widening the gap between planning and response. Information and knowledge management is a core component of effective emergency response, but practical drift seriously limits this ability when crises or emergencies occur.

Snook's theory advocates a close interconnection between planning and practice as the best defense against practical drift. Knowledge sharing between emergency planners at the organizational level and responders at the local level is vital to overcoming practical drift, as is developing emergency plans that recognize the value of situational adaptation. Closer coupling between emergency planning and response will also save time, a critical component of successful crisis management, and allow emergency responders to more correctly anticipate and mitigate an emergency's secondary impacts.

Emergency planners and responders need more interaction, allowing emergency planners to develop plans more in tune with situational realities and allowing emergency responders greater access to the planners' theories and expertise. The knowledge gained from situational implementation is vital to maintaining the relevancy of emergency plans. Relevant, flexible plans that adapt to local situations will be much less vulnerable to practical drift, resulting in better emergency response and impact mitigation.

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See Also: Collaboration; Command and Control; Coordination; Crisis Communications; Emergency Management Systems; Interoperability.

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Pre-Crisis Training and Planning

To attain great skill and knowledge on a subject, one must either go to school to obtain information through formal education channels or simply practice, practice, and practice some more. Only then can specific goals and objectives be reached. This is also true for managing crises and disasters if reputation, property, and lives are to be saved during drastic situations. Trying to respond effectively to a disaster when it has already occurred can create even greater negative impacts to communities, corporations, and people. When a situation occurs, it must become instinct—second nature—for a crisis management team (CMT) to know which activities need to be implemented. This is only attained if CMTs receive pre-crisis training; on-the-spot training won't work. What needs to be considered to ensure CMT personnel receive sufficient training in their roles to enable them to calmly respond to crises and disasters?

Involvement and Active Participation

Often, plans and processes are created and documented by knowledgeable, well-intentioned individuals or teams and then provided to others for use during times of crisis.

The plans may follow specific standards and methodologies, yet they aren't tailored to the nuances of the community, corporation, or individual. Because of this, some plans are not "bought into" by teams, most notably the crisis management team. Following this method means that many teams are told what they are responsible for, which sometimes includes roles and responsibilities that aren't normally part of their everyday operation.

For a documented plan to be effective, it must receive input from the team members themselves and be validated. They are the subject matter experts (SME), after all, so who better to know what their roles should be? Without SME input, the plans and processes may not be correct, as the SMEs validate the content and the process flow to ensure that small nuances—that may not be known to others—are captured. In this way, they are also validating the plan, or at least the documented components. Validation is also performed when the plan is tested.

Tests—either tabletop walk-throughs, simulations, or functional component testing—will help identify gaps in the plans and processes that may not have been considered when being documented. Based on the test situation and scenario, the plan is being challenged as the teams walk through their roles and responsibilities, finding and correcting the course of action presented by the tests. This is how the validation works and how the CMT members are able to familiarize themselves with their roles and the expectations of other teams. It provides a way for teams to work together and interact in a way that they may not have the opportunity to do during normal operations.

Test the Plan, Don't Plan the Test

There is an old expression: "Can't see the forest for the trees." It means that sometimes people

Case Study: Montreal Human Resources Firm Crisis Management Training

In August 2007, one of Canada's largest human resource service providers found itself in a dilemma; its downtown Montreal location was in the middle of an evacuation zone because subway/transit workers discovered cracks in an underground subway passage. The fear was that the tunnel could collapse and bring down several buildings with it, including the one that housed the service provider.

The company had a newly implemented "incident management" protocol, which was utilized to address the situation. However, because it was so new, not everyone understood what the process entailed or who was in charge. Since most of the previous incidents had been information technology (IT) occurrences, those in Montreal thought IT was the leader in this incident as well, but it was not an IT issue; it was a facilities concern. Eventually, the situation was resolved and operations went back to normal, but it did create a concern that existing crisis/incident management teams weren't clear on what their roles and responsibilities were because confusion was caused during the Montreal crisis. As a result, a change was needed in the training and awareness activities related to the crisis/incident management teams. This is what they did.

On an annual basis, the company performed a very large IT restoration and recovery exercise at an off-site location and usually included end users. A central coordinator—usually the Business Continuity representative—managed the planning, execution, and subsequent follow-up activities. However, the next exercise—after the Montreal incident—would be managed differently.

The various components that made up the crisis management team (CMT) structure would be involved with the next exercise and would be responsible for communications within their respective teams and to report statuses, plan activities, execute activities, and manage their own issues and risks. At predetermined scheduled intervals, the leaders of each CMT team would meet to address their status and progress and jointly address risks and issues that needed to be addressed to ensure the exercise fulfilled its scope.

Any issue identified was assigned to the team that actually owned the issue rather than it being forwarded to the exercise coordinator for further investigation. This simulated what would happen in a real crisis/disaster. For example, if an issue was identified that had to do with travel or accommodation, it was forwarded to the Human Resources team, as that was the team that addressed these kinds of things during normal operations, not just during times of disaster or crisis.

Even during the exercise itself, CMT leads and members set their own schedules to ensure appropriate coverage and skills levels were available at all times should an issue arise for their team to address or identify. This approach enabled the team to work together and build their roles and responsibilities to suit what they would actually do in a crisis/disaster, rather than follow a predetermined script they were not part of building. The original CMT plan was used as a base, and teams built on it.

Using the documented CMT plan, which contained roles and responsibilities, the team was now able to proactively identify gaps in the plan and help validate its roles—as well as others—as part of the CMT.

In the end, there were 170 people involved in five facilities spread over three countries. The process helped uncover inconsistencies and assumptions that were made by all team leads and team members. It also helped dramatically increase emergency management/crisis management team/IT Disaster Planning awareness, knowledge, and effectiveness—as well as teamwork—that was utilized to address future incidents.

can't see what they are looking for even though it is right in front of them. They waste effort on activities that aren't initially required. CMT planners and members often concentrate on the minute details within the plan to ensure positive test results and forget about the overall plan. Focusing on the minutiae of the plans at the outset interferes with the development of the plan. It's as if a builder is more worried about the color of the walls in the third bedroom than whether the structure of the house meets the needs; once that is done, then one can begin to delve into the details.

When it comes to tests, there is a lot of planning that goes into them, yet often the planning effort is for activities that wouldn't normally be performed if it were a real crisis or disaster situation. When this occurs, it negates the plan because the focus has been on the planning effort rather than on a real-world result. There may be some activities that require planning—booking hotels, travel arrangements—though if these are part of a CMT plan, then that particular section of the plan should be tested as it would be performed and coordinated in a real situation, not "watered down" for a test.

CMT plans and processes contain specific roles and responsibilities for teams and team members; these are what should be tested. Sometimes the CMT roles are assigned to specific individuals, but this assumes they will be available when the crisis or disaster occurs, which may not always be the case; an individual could be hurt in the disaster or away at another location and unable to perform his or her activities. The roles that are documented have to be communicated and validated by others so that there can be an identified alternate in case a primary person is not available.

A Federal Emergency Management Agency's Urban Search and Rescue team official (right) trains a Massachusetts Army National Guard member on using the Jaws of Life during training exercises in Niagara Falls, New York, on November 5, 2009.

During normal operations, there are accepted and expected communication strategies and channels that are used to convey information to keep communities involved, individuals connected, and corporations producing their products and services. However, in a disaster or crisis situation, the demand for information increases and the time frame for that information to be disseminated decreases. During CMT tests, these communication channels and strategies must be validated, as they may not work under stressful situations.

The disaster may demand specific communications and presentation not normally dealt with during times of calm and peace. For instance, if the crisis has created casualties, then those on the CMT team may not be familiar with how to communicate this to the media or the public, or to provide information to families and friends who have lost a loved one. In a situation like this, it's beneficial for CMT members to receive training in public relations (PR) because if the public isn't satisfied with the information being conveyed—or employees, if it's a localized situation in a corporation—public perceptions can turn against the CMT, resulting in rumor and conjecture.

Not being fully trained can also lead to a career-ending move, such as with the former chief executive officer of British Petroleum (BP) after the massive oil disaster in the Gulf of Mexico when he stated that he "wanted his life back." This comment put the public fully against any goodwill and compassion BP was trying to convey. This is the type of PR blunder that CMT members must be fully versed in.

Risk and issue management is something that must be validated prior to a crisis or disaster. Though the issues and risks associated with each situation will be different and defined by the situation itself, the communication channels and the management associated with them must be validated. If there are assumptions that specific issues will be dealt with by specific teams, those crisis management teams must know what is expected of them to manage and communicate the issue, from identification through to resolution. This includes ensuring that the latest issue/risk updates are provided to those responsible for communicating the issues externally—the PR representatives and media spokespersons.

It may be discovered through training provided prior to any crisis or disaster that the team(s) responsible for specific tasks aren't the best fit for managing the tasks. It could be discovered that another team is required or a restructuring of an existing team is needed if expectations are to be met and addressed effectively when the "real thing" occurs.

This is the value of participation and involvement by CMTs and team members. Being a part of the team and having the ability to validate roles and responsibilities lessens the chances of things going astray during a crisis or disaster. It doesn't ensure that the risk for mistakes is gone, but it does ensure that any potential risks and issues are proactively identified and mitigated before they occur, which in a real situation can save lives, property, and reputations.

Involve the Outside

Not all crises and disasters are localized to a specific organization, individual, or small community. Often, they are widespread and require the participation of many groups to enable them to provide a sufficient and effective response. In many instances, there is a need to ensure that these numerous groups coordinate their efforts and don't get in the way of what is important: the effective response to a disaster or crisis.

For example, the CMT members must interact with first responders (i.e., police, fire marshal, medical staff, etc.) and understand what information they require to perform their role upon arriving at the disaster scene. If a crisis management team has not been made aware of what the first responders require and how they themselves fit into the activities, it could place lives in danger. What can community CMTs and organization CMTs do to learn from the first responders and build their plans?

When fire drills are performed, show the fire marshal the plans and processes in place to ensure that what has been documented meets the standards provided by fire departments. The fire marshal can offer many suggestions to enhance evacuation processes and provide input on seemingly good assembly locations, that, after observation, could actually hamper a firefighter's ability to reach the impacted zone because the assembly location is too close to an entranceway or driveway.

The same can be done with partners and vendors, where each may have specific expectations that must be met when a disaster strikes. Company A may expect Company B to perform specific activities or notify it through a specific channel when a disaster strikes, but if this is not known prior to the disaster and not proactively identified and incorporated into the CMT plan, it could damage relations between the two partners.

These pre-planning activities can help solidify activities for community organizations and business organizations when they encounter disasters. They build relationships and provides opportunities for learning to help each other when needed.

Continuous Improvement

"The only constant is change," as an old phrase states. This is true for technologies, communities, plans and processes; this also holds true for any crisis management team.

As organizational structure changes, so too must the associated roles and responsibilities of the CMT. In some instances, a member of the CMT may no longer be responsible for a specific activity in his or her daily business/operational role but then can be expected to return to it when a crisis or disaster occurs. The problem here is that the role now belongs to another, which causes confusion and miscommunication between the "new" owner of the role and the "old" owner of the role, and there is the possibility that both have differing views on how to execute the role.

Prior to any crisis, the CMT must be aligned with the organization to ensure that each member is current with expectations. If the CMT isn't aligned, there is the possibility of assumptions being introduced that may only cause more problems; for example, such things as a CMT believing that another team is performing an action when in fact, because of an organizational change, it is no longer performing.

The CMT can also learn from smaller crises and incidents within its areas of expertise. A major disaster does not have to occur to enable the CMT to learn lessons from other occurrences. The findings from tests can be incorporated into the CMT structure to ensure that it is improved and kept current. If the CMT plan—and individuals assigned to the team—aren't reviewed, challenged, and amended on a regular basis, the plans that contain critical information needed at the time of a disaster just collect dust. They then only represent the CMT at a single point of time, a time that could be years in the past and of no benefit to a community or organization when a disaster strikes.

Like many industries, the crisis management, IT (Information Technology) disaster planning, and business continuity management (BCM) industries continue to grow and uncover new opportunities for enhancement. For crisis management teams, members should be provided the opportunity to network with other professionals and practitioners to discuss strategic methods, which can challenge existing methods. These new ideas can be taken back to a CMT and incorporated to strengthen tactics.

Continuous improvement of the CMT pre-crisis opportunities fortifies plans, processes, and skill levels so that those responsible for responding to disasters are better prepared and have a greater level of knowledge to address the situation.

Preparing crisis management team members for disasters is directly attributed to the level of preparedness and response applied to disasters and crises. The more team members know and the more they are challenged through various tests and exercises, the more they are in control of what is required and the more they understand their role in that disaster. It lessens the confusion that can dominate disaster situations, and it can ensure that community responsiveness and organizational responsiveness reduce the severity and impact of a disaster through saving lives.

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See Also: Contingency Planning; Incident Management; Incident Response; Preparedness; Prevention; Scenario Planning; Training.

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Pre-Impact Planning Process

Disasters and crises become defining events in a hazard cycle that is marked by four temporal stages: mitigation, preparedness, response, and recovery. As such, according to Kathleen Tierney et al., primary agencies (law enforcement, medical, armed forces, city planners, governmental, contractors, etc.) are those that strive to "decrease vulnerability to major disaster by taking measures to reduce casualties and exposure to damage and disruption or that provide passive protection during disaster impact." In this way, mitigation strategies aim toward reducing hazard exposures and developing emergency response plans in the event of major disaster or crisis. For emergency agency response to be effective, therefore, individual social units must be well versed in different forms of proactive response that is sensitive to the community in which the emergency plan is developed.

Simply put, Tierney maintains that organizational preparedness includes developing "emergency response plans, training employees to proactively and response personnel on what to do in an emergency situation, acquiring needed equipment, supplies, and materials, and conducting drills and exercises." Further, it is imperative that members of emergency response agencies participate in "drills" that enable them to keep their rescue and recovery skills as honed as possible. As such, in the event that a natural or technological disaster occurs, emergency plans and agencies need to be mobilized smoothly and effectively, so as to bring the greatest aid to the largest number of people within the shortest amount of time. For that reason, emergency response plans are put into place to mitigate the direct effects of whatever the emergency may entail by responding to the immediate needs of the disaster victims.

Because of the possibility of the occurrence of disasters of unprecedented size and destructiveness, it is necessary that each state create an emergency management agency that is charged with authorizing emergency management programs, to give the governor the power to declare a state of emergency should the need arise, and to coordinate varying offices during a state of emergency to charter appropriate aid to the areas most in need. The state emergency management agency is also charged with coordinating volunteer efforts (e.g., Red Cross, humanitarian aid, etc.) and remains effectively the "go to" arena for entities wishing to assist in the event of disaster after the state governor has declared a state of emergency.

When emergency agencies (police, fire, EMS, National Guard, armed forces, etc.) are mobilized, the primary emphasis of their actions must be to work to "reduce casualties, damage and disruption, and to respond to the immediate needs of disaster victims," says Tierney. Mobilizing response agencies at the local, state, and governmental levels requires an ability to evaluate and neutralize potential threats, sending out necessary warnings to vulnerable populations regarding specific hazards in and around the disaster zone, evacuating populations requiring such, conducting search and rescue operations for victims of disasters, administering medical care, and providing emergency shelter and food until the situation is neutralized. Further, once the immediacy of the crisis has passed, emergency response agencies work to repair, rebuild, and reconstruct (if possible) damaged property, in an attempt to remove populations displaced by crisis and disaster from temporary shelters back to their permanent residences as quickly and as efficiently as possible.

Returning to the issue of organizational effectiveness, it is clear that local, state, and federal agencies must have a plan in place that governs the ways in which individual agencies will coordinate with other entities to ensure the safety of communities at risk. More specifically, it is important for emergency plans to be drawn so that the degree of emergency/crisis is recognized and requisite response teams are able to jump into action when presented with specific critical issues and problems. Therefore, local, state, and federal governments have been charged by the Federal Emergency Management Agency (FEMA) under the governance of the United States Department of Homeland Security (DHS) with developing specific levels of response, including which teams will respond to specific types of threats, as well as the types of action deemed to be appropriate responses given the threat at hand.

Local, state, and federal emergency planners have identified four levels of response for emergency entities:

Level 1 indicates routine operations. Occurring and forecasted events present little, if any, threat. Events are monitored and managed successfully by the appropriate agency, but additional emergency agencies are not required to respond.

Level 2 indicates a "heightened sense of awareness. Occurring or forecasted events include a potential or present threat. [Examples: weather or river watch/warning, volcano status changes, multiple wildfires, extended search and rescue, or a law enforcement action.] Events exceed routine, but responsible offices are able to manage with additional support from commonly used sources," as described by Ready Alaska. At this level, the Department of Homeland Security and emergency managers may develop search-and-rescue teams and may also call upon local emergency planners to "mobilize additional staff, as well as to continue to evaluate" the critical issues at play during the incident. It is important to note, here, that at this level, local, state, and federal emergency managers, acting under the rubric of the Department of Homeland Security, maintain the primary responsibility for managing the integrity of the disaster zone, together with the management of the situation.

Level 3 indicates that an "actual event has occurred or may be imminent. [Examples: river flooding disrupts public transportation, extended search and rescue requires interagency support, a wild land fire requires evacuation and shelter planning, or raised State Homeland Security Threat Level.]" At this level, a local emergency operations center is opened, and elected leadership (state governors, the president of the United States, etc.) may declare a disaster area, so as to unleash federal funds (administered through the Federal Emergency Management Agency [FEMA]) in such a way as to assist with the immediacy of displacement following major emergency. When mobilized at this level, local, state, and federal agencies work together to manage the local crisis. At the mobilization of a Level 3 crisis, the Department of Homeland Security maintains the primary jurisdiction over the crisis, but may seek assistance from other agencies to assist with crisis recovery.

Level 4 is invoked in response to the most extreme life-threatening and/or property-damaging event. "[Examples: a river flood, sea storm surge or tsunami displaces residents and damages structures, a woodland fire requires evacuation and sheltering of residents, or a damaging earthquake occurs]." At this level, the situation is so dire that it cannot be handled exclusively at the local level. Instead, Level 4 crises require significant "mobilization of emergency resources from agencies in multiple levels of government." During these sorts of extreme emergency events, significant interagency cooperation is a must and is achieved through a statewide disaster declaration by the state governor.

Once again, at this level, primary crisis response is developed, coordinated, and mitigated by the Department of Homeland Security and FEMA. However, in the event that the crisis at hand exceeds what the state and local governments can provide, the governor of the affected state may file a request for a Presidential Disaster Declaration. In so doing, and if the president does declare a specific area as a disaster zone, this action mobilizes federal aid resources and funds to be administered by FEMA.

At the local and state levels, therefore, specific criteria are referenced in such a way as to determine the level of preparedness and potential for crisis in a given region. This analysis includes but is not limited to the following issues affecting entities that may find themselves in a disaster zone, as described by Ready Alaska:

- "Actual or forecasted weather events that may cause significant impacts" on citizens and their property
- "Occurring or predicted geologic events that can cause impacts to people, property and transportation systems [Normally these will be volcanic eruptions or increases in seismicity. Earthquakes could change preparedness levels, however that will normally occur after the event]"
- "Wild fire activity throughout the State which impacts how other agencies can respond"
- "Availability of emergency response and recovery resources statewide"
- "Significant events occurring in communities that may impact their response capabilities [Could be power system failures, water and sewer system problems, large fires, etc.]"

In sum, agency notification and mobilization remain linked to the type of crisis being experienced, the breadth of resources needed to combat the crisis, and how widespread and far-reaching the critical issues are vis-à-vis the types of resources available to combat them on a local, state, and/or federal level. Further, one additional component must be considered when evaluating issues of agency notification and mobilization, namely, the role of social media (g.e., Facebook, Twitter, Foursquare, or Google Plus) not only in creating fast and easy to access victim/missing persons lists but also in serving as a central point through which volunteer agencies and groups can mobilize their resources and network with others in a quick and easy-to-use platform. Further, social media works to bring communities together quickly and enables an important volunteer platform for the mobilization of resources in addition to those resources that are brought in by local, state, and federal government. This is especially important when conventional forms of communication break down (as was the case with the two-way radios during the 9/11 terrorist attacks and during Hurricane Katrina, when volunteers formed the "Cajun army," a group of volunteer boat owners who organized themselves and then braved the waters in the Lower Ninth Ward of New Orleans to rescue people from their rooftops and from the toxic floodwaters). As such, while the conventional forms of networking and drawing upon local, state, and federal resources are important, indeed, these efforts are often augmented by the mobilization of the masses, who, if they have resources available to them, often jump into the fray to assist conventional aid workers, often with extremely positive results.

Issues relating to agency notification and mobilization are complex, as communication among and between local, state, and federal agencies can often be mired in red tape. However, recognizing that significant changes have been made since the well-documented debacle immediately following Hurricane Katrina involving the breakdown in getting aid to those who were trapped in the Lower Ninth Ward of New Orleans and in the shelters of last resort (the Superdome and Convention Center), social media sources (Facebook and Twitter) have also taken hold as key social institutions available to mobilize resources in the event of significant disaster or crisis. As the crisis emanating from Hurricane Katrina has made exceptionally clear, not only do local, state, and federal entities play a role in the mobilization of resources (and only do so when notified by official state personnel), but social media also play a pivotal role in bringing aid to victims of crisis and disaster.

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See Also: Disaster Risk Reduction; Operational Readiness; Preparedness; Prevention; Risk Assessment.

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Preparedness

Preparedness, in the context of crisis management, relates to various activities and precautionary measures to protect a group, an organization, or a society as a whole against a possible crisis. They include, among others, goal setting, plans preparation, simulations and exercises performance by all the relevant stakeholders, target audience training, and evaluation of the whole process. Appropriate preparedness should minimize the damage that may be caused by crises; improve the community, organizational, and interorganizational response to crises; and reduce negative consequences.

There is an important dialectic of the two terms *preparedness* and *vulnerability*. While the former describes the degree of readiness in the face of a certain kind of crisis and the measures taken before it happens, the latter relates to the degree of nonreadiness for this kind of situation, which may be aggravated by the failures of the relevant protective systems, socioeconomic factors, and weakness or dysfunction of emergency management authorities. Preparedness and vulnerability thus constitute the two sides of the same coin: when preparedness increases, vulnerability decreases, and vice versa. Appropriate preparedness should deal with the changing patterns of vulnerability in the organization, community, or a society as a whole in order to minimize the negative consequences on individuals' health and safety as well as damage to community and organizational structures.

Case Study: Crisis Management Preparedness at the Israel Crisis Management Center

The Israel Crisis Management Center (SELAH) is a nonprofit association that assists new immigrants who experience severe crisis or tragedy situations. While a native Israeli may turn to family and friends during an emergency, new immigrants to Israel are often left vulnerable, isolated, and without essential resources at the most difficult and painful of times. Many find themselves faced with new surroundings, lacking the basic familiarities of language, cultural know-how, community ties, or extended family. Responsive to the varied cultures and mores within Israel's immigrant population, in times of crisis SELAH reaches out to immigrants from all countries, including the bereaved; survivors of war and terror attacks and their families; victims of road or work accidents; people displaced following a disaster such as fire, storm, or flood; and those suffering from sudden, serious illness.

SELAH's crisis professionals and trained volunteers, responding throughout the country, go to homes, hospitals, and other scenes of crisis to identify immediate emergency needs. This requires acute listening skills, sensitivity, compassion, and the practical know-how to determine how best to effectively deliver emotional support and essential practical aid. Crisis preparedness at SELAH thus centers on sensitivity training and instruction on accessing agencies, services, professionals, and emergency supplies.

Process of Preparedness

The process of preparedness includes both internal and external dimensions. The external dimension includes establishment and maintenance of working relationships with all the relevant governmental agencies (such as the Ministry of Absorption, Ministry of Health, Ministry of Welfare, hospitals, municipalities, etc.) and various social organizations that deal with crisis-related issues. The internal dimension of preparedness refers to the ongoing process of peer learning, supervision and instruction, common sharing of best practices across the organization, fund-raising methods to be able to address crisis-related needs of the target populations, identification of lessons learned from each crisis intervention carried out by SELAH, and more.

One of the special characteristics of SELAH's preparedness relates to the recruitment of volunteers and professionals who can fluently communicate in the mother tongues of immigrants (such as Russian, Amharic [one of the main languages in Ethiopia], Spanish, English, and Farsi [the main language in Iran]). These language skills are important for establishing comprehensive, sincere, and trusting contact with the individuals hit by crisis and aid the organization in effectively providing the required assistance. In addition, most of SELAH's volunteers are fluent in Hebrew and so bridge effectively between the immigrants and the relevant authorities. The organization provides assistance for immigrants hit by crisis including emergency grants in acute crisis situations, provision of burial and tombstone costs and food for the mourning period, psychological support and grief counseling, local transportation costs for hospital and rehabilitation programs, a plane ticket for the next of kin from abroad needed for the care of the victim or family, assistance with children's day care or elderly care, legal support, and recipient advocacy. This variety of activities carried out following the crisis, and the sudden nature of many kinds of crises, require a constant process of learning and a high level of readiness of the organization as a whole and of each of its members to address effectively and rapidly the emerging needs.

Immediate response is also facilitated through the hotline that is available 24/7. Naturally, this hotline is extremely busy in times of nationwide or regional crises, when immigrants require specific assistance and there is a great need for reliable information in their native language. In addition, during large-scale crises SELAH immediately establishes emergency headquarters that coordinate all the assistance activities through constant telephone and electronic communication, contact with the representatives in the field, and timely meetings for update and guidance.

One of the key characteristics of SELAH's assistance model is its cultural sensitivity and

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unique approach to each case of crisis. This enables SELAH's caregivers to closely connect to people from different backgrounds in times of crisis and to provide effective help. SELAH shares its approach with professionals and organizations dealing with crisis management and preparedness issues in various countries. The need to respond to a wide range of unexpected crises on a daily basis and working with an outreach model developed through years of experience are key factors that may explain SELAH's high level of preparedness in the context of crisis management.

Cooperation of Stakeholders

The process of preparedness, in the context of crisis management, may involve a wide range of stakeholders, which may interact in different ways, such as roundtables, task forces, multilateral projects, joint planning, common drills, electronic communication (e-mails), and interaction through digital social media. The list of stakeholders may include governmental agencies, nongovernmental associations, business companies, nonformal civil society groups, and residents. Regarding severe crises on a national or a local level as a result of human-induced or natural disasters, the main governmental agencies that are usually involved in preparedness are the emergency management authority (which may have another equivalent title); police, fire and rescue departments; relevant military representatives; emergency departments of governmental ministries; and elected officials (whose extent of interest in crises-related issues may greatly vary according to their political choices and priorities).

Depending on the nature and the specific characteristics of a crisis, the involvement of additional relevant governmental structures may be required. Each of the stakeholders has its own specializations and, accordingly, the extent of its desired involvement will vary across the areas of preparedness activities. Regarding the nongovernmental stakeholders, they may include local and national social organizations and volunteer groups, community centers, neighborhood committees, professional unions, health care organizations, and advocacy activists. The business sector may also be involved in crisis management along with other stakeholders. Besides the above formal stakeholders from various sectors, there are also informal groups that may also desire to participate and contribute to crisis preparedness. These stakeholders may include informal community groups and active individuals.

It should be stressed that not all of the above stakeholders will be actually present in each crisis, on every national or local arena. The above list only describes the variety of possible stakeholders. However, every country, region, organization, and community is characterized by a unique combination of legislation, administrative requirements, economic and political conditions, and cultural and social norms. The above features and the specific nature and characteristics of the crisis will influence the actual involvement of potential stakeholders in the preparedness process. Two additional factors will also determine whether a certain stakeholder will be involved in interactive preparedness activities: (1) the relative importance that crisis-related issues have in the stakeholder's set of priorities and (2) the extent of the stakeholder's willingness to cooperate with other partners on the issue of crisis preparedness.

The combination of all of the above factors will create the unique "mosaic" of the involved stakeholders in each case of crisis preparedness. Generally speaking, it may be said that the more stakeholders from various sectors that take part in the process of crisis preparedness, the more needs of various groups will be effectively addressed. In this context, the issue of representation of various groups with special needs (such as the poor, new immigrants, homeless, people with disabilities, children, elderly, and more) is important. In various crises in the past, the above groups were found to be more vulnerable during crises, and they may need a special or greater degree of assistance.

Those stakeholders who are closely familiar with the unique characteristics and specific needs of these groups may propose more comprehensive and appropriate plans and actual activities, as well as raise the general awareness regarding the underprivileged groups in the context of preparedness for various crises.

The quality and the extent of the cooperation between the involved stakeholders highly influence the actual level of crisis preparedness. Moreover, the more that effective cooperation mechanisms—on the national, regional, and local levels—are established and developed during the preparedness stage, the higher level of crisis response may be achieved. These general conclusions were derived from a variety of crises all over the world. The joint efforts of the stakeholders create integrative and comprehensive crisis plans and thereby multiply the ability to cope rapidly and effectively with possible negative consequences. In addition to the clear "technical" advantages of the involvement of stakeholders from various sectors to accomplish complex crisis-related missions, the cooperation also promotes the sense of collective efficacy in a community in the context of its preparedness to cope with a crisis. This means that the more institutions are involved in the crisis-related processes and the more effectively they interact among themselves, the stronger is a mutual belief in the community that it is capable to confront the crisis.

In addition to interorganizational cooperation, it is very important that each organization by itself be well prepared. To achieve that goal, there is a need to conduct an ongoing process inside the organization that includes the stages of (1) goal setting, (2) detailed planning, (3) performance of preparedness activities, and (4) evaluation. The stage of goal setting should identify the main crises that may be relevant for the specific organization and derive main areas of required preparedness. The next stage of detailed planning should determine which various specific measures should be taken to achieve a high level of preparedness for the relevant crises. The further process of performance of preparedness activities should be ongoing and ensure that a high level of preparedness is achieved and constantly maintained. The stage of evaluation should include a detailed examination of the previous three stages and, in case of need, the recommendations for changes should be made. An expanded version of the evaluation process may include also an important component of learning the lessons of other similar organizations. In general, the combination of comprehensive intraorganizational and interorganizational preparedness processes should enable a high ability to confront the crisis. Preparedness is based on the general principles described above, although a high preparedness for a specific crisis in any given location and context requires a careful adaptation and assimilation of these general guidelines to the specific reality. In addition, because of the complex nature of crisis emergence, the achievement of a high level of preparedness should be based on a constant process of learning and increased awareness to the changing reality.

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See Also: Civil Protection; Contingency Planning; Coordination; National Preparedness Goal; Nongovernmental Organizations; Operational Readiness.

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Prevention

Prevention is a critical part of the crisis management process. Prevention in this article is defined as a means to keep something from happening. Prevention refers to those intervention and mitigation measures that have been put in place prior to the onset of an event. These intervention and mitigation measures to prevent a crisis can include, for instance, those to detect, contain, notify, and delay an event that otherwise, if it were left unmitigated, may result in a crisis or disaster.

Developing prevention plans can be broken down into the following tasks:

- Data harvesting
- Establishing objectives
- Establishing performance criteria
- Identifying hazards
- Developing prevention options
- Evaluating/selecting prevention options
- Documentation
- Implementation and updating

Task 1: Data Harvesting

Developing prevention plans starts with gathering data and information related to the assessment. Pertinent information to assist in establishing the context of the assessment may include the following items:

- Stakeholders
- Regulatory environment
- Financial situation
- Culture/social environment
- Vulnerabilities
- Resources (e.g., personnel, capital)
- Occupant/emergency responder characteristics
- Operational/functional characteristics
- Timeline

Task 2: Establishing Objectives

Objectives then need to be established. Objectives typically reflect a common aim of the stakeholders involved. Objectives can be measured qualitatively rather than quantitatively. Objectives typically are stated in different forms. These are dependent on the intention of assessment and what the prevention measures are intended to do. With respect to crisis management, prevention can assist to further understand impacts on such areas as people (general populations, emergency responders), property (contents, structures, etc.), continuity of business operations, cultural heritage, and the overall environment. Stakeholders' objectives can also lead to identifying how prevention is to be developed and implemented.

It is important to note that objectives may not be the same everywhere or for everyone and will need to be developed and tailored to each individual situation. For example, objectives that have been established for a single building may vary from those of other buildings on the site because of its criticality to overall operations, vulnerability to specific hazards, degree of redundancy, and other related criteria. There may be times that objectives established for a given situation compete with each other. These should be appropriately assessed. This, for instance, occurs at times with life safety–related matters with regard to fire when one needs to try to contain the heat and smoke while at the same time allowing occupants to exit and emergency responders to enter various compartments and stairways in a building.

When developing objectives related to prevention, one needs to comprehend the vulnerabilities of a given situation. This assists in identifying the risk and in determining whether it is acceptable or whether additional prevention measures or other mitigation measures may need to be provided to manage a hazard. These assessments and understandings need to occur, as they will feed into the development of the next step in identifying specific performance criteria for the specific hazard(s).

The objectives are next transformed into quantitative performance criteria.

Task 3: Establishing Performance Criteria

Metrics then need to be developed so as to be able to more quantitatively assess the objectives against the hazards. Performance criteria are therefore defined in terms that can be directly measured or calculated. For instance, in business or industry, this may be stated in terms of maximum downtime, or in disaster management, performance criteria may be quantified in terms of an earthquake's magnitude and location, or the highest potential flood level.

Task 4: Identifying Hazards

A significant quantity of potential hazards or events may exist that could lead to a crisis for which prevention is desired. Hazard identification techniques are often used to assist in condensing the universe of scenarios that are "possible" to "credible" scenarios representing more of a primary concern and higher probability. Following the identification of hazards, possible scenarios then need to be developed. The scenarios describe further details of the specific hazards and provide further quantification. For instance, fire scenarios may include characterizing ignition, growth, peak heat release rate, steady burning period, decay, and extinguishment.

Task 5: Developing Prevention Options

Following the development of hazard scenarios, prevention options should be examined to address these. Prevention options may include physical protection measures as well as legislative measures, for instance, for the control of land use and codes of construction. These prevention options may reduce the physical vulnerability and/or exposure to risks such as through infrastructure (e.g., dams, flood dykes, etc.) and through improving existing infrastructures and sustainable development practices.

Although there may be a significant number of options available, it is important to be familiar with one's objectives and undertake various risk assessments to assist the stakeholders to make informed decisions regarding the prevention options to achieve these objectives. Stakeholders may also have to assess the mitigation measures against the impact they bring regarding mitigating the event, their costs, and resources to determine what needs to be done and the path forward. A cost-benefit analysis could be quite useful in accomplishing this.

With regard to fire, the following may be included in a fire prevention plan to help reduce the ignition of a fire, as well as the impact that this could have:

- Limiting ignition sources (e.g., old wiring or exposed light bulbs)
- Reducing the quantity of combustible materials (rubbish removal, remote storage, etc.)
- No smoking
- Inspection, testing, and maintenance of systems
- Control of hot works (cutting, welding) and a permitting process
- Protecting cooking/kitchens
- Appropriate use of portable heaters
- Reducing electrical hazards
- Reducing chimney hazards (cleaning, etc.)
- Appropriate handling, use, and storage of flammable/combustible liquids

Task 6: Prevention Evaluation and Selection

The next task is evaluating prevention options as to whether they address previously established performance criteria and objectives. The assessment may incorporate qualitative and/or quantitative evaluations as to the event's probabilities as well as analyses of the potential losses and/or damage that may occur. During the assessment process, all of the data that stakeholders may need may not be available, and one should be prepared to make appropriate informed assumptions and carry out appropriate variability analyses to test these and their implications on the outcome and ability to achieve the objectives.

Several types of tools/methods are available to assess these. These methods can range from simple "back-of-the-envelope" correlations to more complex computational modeling to assessing historical events to detailed probabilistic studies, including fault trees, event trees, HAZOPS, and others.

When the prevention options are assessed and shown to be able to meet the determined performance criteria, they can be chosen as suitable for implementation. Note that the evaluation is iterative and there may be several mitigation options to be evaluated against the various events and hazards. Once the analyses have been done, then stakeholders can make appropriate and further risk-informed decisions.

Task 7: Documentation

It is important to document the process and the results of each task, what led to the selection of the chosen prevention options, and how they are to be implemented. This helps promote understanding among the stakeholders as to the basis of the assessment and saves time and effort for future inquiries and development as, again, this is an iterative process. The various assumptions and processes should be clearly stated along with objectives, vulnerabilities, and hazards. Uncertainties and variability of these assumptions should be clearly documented.

Task 8: Implementation and Updating

A detailed description of the implementation of the prevention measures and chosen prevention strategy should be developed. This should include details of the prevention measure, costs, schedule, and priorities. The basic concepts of prevention strategy may include the following:

- Raising awareness of the hazards and potential disastrous impact an event may have and the value and benefit of prevention and mitigation efforts to help keep it from happening or to reduce its impact
- Provide teaching and skill building to enable appropriate personnel to continue to develop and maintain prevention measures that are needed
- Mobilize communities, regions, and countries to establish environments enhancing prevention measures
- Strengthen and support regulatory policies that promote prevention of disasters to as great a degree as possible

As discussed above, prevention is an ongoing process. It is important to continually raise awareness, train, and conduct ongoing assessments to ensure that new hazards are not being introduced or created and that appropriate prevention measures are in place. It is also important to ensure that, if appropriate, these are continually maintained, inspected, and tested so that they are in place and function as needed.

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See Also: Disaster Risk Reduction; Emergency Responders; Hazard Mitigation; Hazard Vulnerability Analysis; Protection; Risk Analysis; Risk Assessment; Training.

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Product Defects and Recalls

Consumers rely upon safe, consistent, and reliable products that are available in a convenient and cost-effective manner. When safety or other concerns exist regarding a batch or production run of a product, the manufacturer often makes a request to return to the maker or distributor the goods over which concerns exist.

Such a request is called a "product recall" and is designed to avoid harm to the public, avoid negative publicity, and reduce or limit liability for corporate negligence. Product defects and recalls are of great concern to consumers, government agencies, manufacturers, and retailers, as an orderly response to the discovery of product defects both protects the public and safeguards corporate value. Although product defects have always existed, it is only over the past 50 years that product recalls have become common, this growth driven by increased concern about public safety, liability issues, and media coverage.

Process

Though product recalls are often controlled by state or local laws, the general process is fairly established and consistent from jurisdiction to jurisdiction. First, the manufacturer becomes aware of a defect in a product it makes. This awareness may come as a result of consumer complaints, internal quality-control mechanisms, or other channels. Second, the manufacturer or its distributor notifies the authorities in a particular jurisdiction of the product defect and its intention to recall a product. In anticipation of this, communication channels are established, often including consumer hotlines or other sources of information. At this point, the scope of the recall, such as which serial or batch numbers are to be recalled, is established. Third, product recall announcements are released by the manufacturer, distributor, or appropriate government agency. These releases may take place through a news conference, via a Web site, through paid advertisements, or some combination thereof. If the product defect is sufficiently significant, the resulting product recall may also generate considerable television, radio, and newspaper coverage. Fourth, consumer groups and retailers who learn of the recall notify the public by various means, including advertisements, announcements, and in-store notices. Such notifications ask consumers to return the goods, regardless of condition, to a retailer for a full refund or no-cost repair or replacement. Finally, possible additional consumer compensation will be made available, often depending upon the specific regulations governing consumer protection, the cause of the recall, and the possibility of lawsuits.

MODEL NUMBER
DATA LABEL with date code
0 WATT
BSI550
m Brushless Alternator
SERIAL NO. 99999 9999
MODEL NO. BSI550-W
09-10-01
PORTER+CABLE
5500 WATT

The Consumer Product Safety Commission can impose a recall in the interest of public safety or cooperate with a company in a voluntary recall, such as DeVilbiss's voluntary recall of its Porter-Cable Portable Generator in May 2005 because of a fire hazard.

Types of Product Defects

Product defects may result from some error that has occurred during the manufacturing process, an unforeseen use of the product that makes it dangerous to consumers, or the consequence of third-party tampering. For example, one of the earliest product recalls involved Cadillac automobiles manufactured during 1959 and 1960. When drivers attempted a 90-degree turn at 10 to 15 miles per hour, the steering linkage (a pitman arm) failed on many of the cars. An investigation by General Motors Corporation discovered that it had sold six times as many pitman arm replacement units during 1959 and 1960 than it had sold during the preceding two-year period, the result of the use of metal that was softer than that usually used. The softer metal used during 1959 and 1960 made the pitman arms less able to withstand the stresses of low-speed turns and resulted in the recall of Cadillac automobiles made during this period so that their steering linkage could be replaced. Such product defects and recalls are not uncommon in the automotive industry, and consumers who have purchased a car that is later found to be defective are provided notice of the defect and asked to bring the car to a dealership where it can be repaired at no cost to the consumer.

Another type of product defect occurs when, because of an error in the manufacturing process, a product is made in such a way that it is harmful to some or all potential consumers. During 1999, for example, the popular restaurant chain Burger King provided children for whom a meal had been purchased with a toy Pokémon character, which came in a Poké Ball, which opened into two parts. In December 1999, a 13-month-old child suffocated while playing with the Poké Ball, causing one of the largest and most expensive product recalls ever seen. After Burger King initially resisted the recall, the Consumer Product Safety Commission convinced the company's management to institute a massive recall of the over 20 million Poké Balls that had been distributed. Recall efforts included television advertisements, in-store posters, and prizes provided to those parents who returned the containers. Although over half of the Poké Balls were never turned in, research indicated that over 60 percent of these were thrown away by parents, which is considered an effective recall.

Occasionally, third-party actions can cause a manufacturer to recall a product. In one of the most famous examples of product tampering, in 1982 seven people living in or near Chicago, Illinois, died after taking extra-strength Tylenol capsules that had been laced with potassium cyanide after their manufacture. Because the adulterated capsules had been manufactured at different factories, yet all were found in the Chicago area, it was determined that the production process was not at fault. Police and other investigators surmised the Tylenol capsules had been tampered with and then left on the shelves of supermarkets and drug stores, where they were purchased by unsuspecting consumers. Johnson & Johnson recalled over 30 million bottles of Tylenol, worth over $100 million, and reengineered its packaging to make future tampering less likely.

In the United States, the Consumer Product Safety Commission (CPSC), an independent agency of the federal government, works to protect the public by regulating the sale and manufacture of many consumer products. The CPSC can impose product recalls if it feels this is in the best interests of the public. The Consumer Product Safety Act of 2008 improved funding for the CPSC and allowed it to create a database that enables the public to report details related to safety problems with consumer goods. Many states have similar agencies that assist with product regulation and recalls.

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See Also: Chemical Risk; Civil Protection; Legal Liability; Policy Setting; Spokesperson, Designating and Utilizing.

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Product Tampering

Product tampering is the deliberate contamination of a good after it has been marketed, often occurring at the point of sale or, in the case of a hoax, after the point of sale. Examples of foreign substances that have been used in product tampering include bugs, cyanide, illegal drugs, needles, mice, liquid mercury, glass, and syringes; these, and even a human finger, have all turned up in a wide range of products.

The act of product tampering can be used by an individual who is looking to cause harm indiscriminately to the public or in an attempt to extort an organization. However, the act can also be targeted. Publications and Web sites exist that advocate product tampering as a technique for obtaining revenge against a corporation or a specific individual. Such promotion of this action has been cited in criminal product tampering cases. Product tampering can also be used as a means of terrorism.

Product tampering monitoring is the study of the manufacturing process and casing for vulnerability to product tampering. Monitoring of corporate and product activity has the potential to reduce the probability of product tampering. Loss of trust, goodwill, and sales are all consequences an organization faces when product tampering occurs. Although product tampering monitoring has direct costs in time, resources, and money, the activity has a payoff in reputation and customer retention.

The Johnson & Johnson Tylenol Recall

One of the most publicized cases of product tampering occurred in October 1982. Bottles of

Tylenol-brand acetaminophen painkiller tablets were contaminated in the Chicago area of Illinois with potassium cyanide at levels that proved fatal to humans when consumed. The first to die was Mary Kellerman, a young child suffering with a cold. Subsequent victims varied in age and other factors, leaving the only link between the victims the fact that they had all taken Tylenol Extra Strength capsules before their deaths. In total, seven people died from ingesting the tainted capsules. After an investigation, it was assumed that the tampering happened at the store level, meaning a still-unidentified individual placed cyanide into the pill capsules after the bottles had been placed on the store shelf. The pill bottles that had been tampered with were returned to the shelf and were subsequently purchased by the victims. The now-deadly pills had come from different production plants and different stores in the Chicago area.

The police believe that a man named James L. Lewis was the culprit behind the product tampering, but no evidence was ever found to incriminate him. He is suspect because of a ransom note he sent to Johnson & Johnson demanding $1 million in order for the killings to end. He was charged with criminal extortion for the note and served 13 years in prison for it. He claims innocence in the Tylenol case, so the case remains unsolved to this day.

Concerned citizens overwhelmed hospitals and poison control hotlines in order to receive care before they, too, could possibly die from cyanide poisoning. Police officers in Chicago went around the city with loudspeakers warning residents of the contamination. The public was instructed that they should not use Tylenol in case it had been tampered with. Stores throughout the nation removed their Tylenol supplies from the shelves as they waited for more information on the cause and the risks to their own stock. In the months to follow the outbreak of the Tylenol tampering, many cases of copycat tampering were reported throughout the United States, with varied methods and varied products, including rat poison and pins in Halloween candy. A positive tangible response to the Tylenol poisoning case and the copycat attempts was that of the other food and drug companies in the United States who improved their packaging to deter further tampering attempts.

Once Johnson & Johnson, the parent company of Tylenol, found out that the deaths could be traced to their product, the company immediately ceased all advertisements for the product and recalled all of the Tylenol Extra Strength pills in the country. The company came to the decision to react in this manner because of its commitment to its credo, which in the first sentence outlines the corporation's belief that its first responsibility is to the doctors, nurses, patients, mothers, fathers, and all others who use its products and services. The recalled product included more than 31 million bottles of Tylenol Extra Strength pills at a cost of over $100 million to Johnson & Johnson. Afterward, Johnson & Johnson reintroduced the product to the market in a safer triple-seal package that complied with the Food and Drug Administration's (FDA) mandate on tamper-resistant packaging. It was the first company to comply with the FDA's tamper-resistant packaging mandate. After this crisis, the company began using the caplet form of the drug, which it claimed was more resistant to tampering than the capsule design.

The act of product tampering causes a reputational risk to an organization and a potential physical risk to the public. An organization must act fast once a claim of product tampering has been made. The organization needs to determine the validity of the claim, the scope of the threat, and the subsequent actions to be taken.

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See Also: Damage Containment; Disruption of Organizations; Food Security; Hazard Vulnerability Analysis; Legal Liability; Manufacturing Risks; Public Relations; Reputational Risk; Sabotage; Terrorism; Threat Detection.

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Protection

The concept of protection at the most basic level relates to issues around dignity, safety, human rights, and the international humanitarian legal framework for addressing the survival needs of refugees, asylum seekers, children, and other such "persons of concern." "Person of concern" refers to an individual who for other reasons has approximately similar situation and experiences to those of asylum seekers, for example, stateless people and internally displaced persons.

The nature of contemporary crises and disasters necessitates that a range of actors meet their international legal obligations and accept accountability for their actions with regard to vulnerable people under their jurisdiction or control. Trends at the beginning of the 21st century seem to indicate a slight decline in the number of refugees internationally. However, there has been a notable rise in the number of displaced people at a global level, and chronic problems relating to protection of refugees and other people of concern have become more complex than would have been envisaged only half a century ago.

History of Protection and Crisis

Problems relating to refugee protection have a long history. Prior to the formation of the United Nations and its agencies, refugees and other people of concern encountered suppression of their basic human rights in some host countries where they had fled to claim asylum, or they experienced generally less favorable treatment than citizens of those countries. Arbitrary and disparate initiatives that were pursued by some nations and groups in the first half of the 20th century often had major shortcomings.

During the period between 1921 and the 1950s, when the first serious consideration of refugees occurred, the policy was characterized by reactive rather than proactive approaches to refugee crisis and problems worldwide. During the three decades following World War I, ineffective mechanisms and lack of readily accessible guidance and relevant skills for dealing with issues relating to protection were commonplace.

The 1951 Convention relating to the Status of Refugees constitutes the key legal document in regard to the legal obligations of states and the basic rights of refugees. Being signatories to and compliant with the 1951 Refugee Convention and, in some cases, the Organization of African Unity (OAU) 1967 protocol, had initially been an attractive course of action for states to pursue during the few decades up to the end of the 20th century. A combination of factors, including conflicts, wars, globalization, improved air and land communication, and in certain cases a search for improved economic conditions by working-age sections of populations, particularly from developing countries, seemed to present new crises in relation to migration.

Toward the end of the 20th century and most certainly at the beginning of the 21st century, there has been a notable shift in the position of states as they face asylum crisis. As a reaction, there have been, for example, controversial interceptions of would-be asylum claimants in international waters offshore Australia, and the European Union (EU) states of Spain and Malta, and also in the United States. Instruments such as the 1951 Refugee Convention, which was designed to address this situation, are consistently coming under question as hosting states attempt to deal quickly with sudden surges in migration.

In a "shrinking world" characterized by improved communication and transport infrastructure, wars breaking out in one part of the world can suddenly result in a potential crisis because of a surge in asylum seekers in another part of the world. In contrast to this, over a thousand years ago, wars in Asia, for example, would have been unlikely to translate into an influx of refugees in western Europe, North America, or Australia.

Thus, where and when there is threat of a crisis or crises, determined by internal or external factors, it has become increasingly difficult to predict the results, and questions remain as to how protection principles will be safeguarded in relation to asylum seekers entering host-country border systems, particularly when receiving countries are operating under considerable strain.

Whether or not the protection is for refugees, other persons of concern, or children threatened or in a crisis situation, success in crisis management will relate not only to the direction of the crisis but also to the vertical or horizontal relationships of the crisis management structure in place. Thus, in summary, the main issues that govern an effective crisis management team safeguarding protection will have certain characteristics. These are further discussed below.

Compliance

To ensure protection issues are addressed in a crisis situation, compliance to the 1951 United Nations Refugee Convention, International Humanitarian Law, the Convention on the Rights of the Child, and the Convention on the Elimination of Discrimination against Women (CEDAW), among other instruments, is critical.

Although the 1951 convention and the 1967 OAU protocol, the international legal frameworks for dealing with refugees, have been widely criticized by some states, they remain perhaps the only available instruments for dealing with such crisis, considering the increasing numbers of asylum seekers, refugees, and internally displaced people; the pressures this brings on host governments can overwhelm border systems. The Refugee Convention is based on the principle of refoulement, which gives states the responsibility not to forcibly return people fleeing persecution back to their home countries if they are in fear of persecution. Arbitrary efforts to circumvent international legal instruments and standards by border systems of host countries during crisis have proven ineffective and are likely to undermine protection principles during determination of refugee status or in other matters that relate to this. As sudden surges in asylum-seeker numbers and people of concern occur and amid pressure arising from sensitivities associated with this issue among host citizens, structures that are unprepared for crisis may fail to make effective decisions.

Since the 1990s, humanitarian agencies and in particular nongovernmental organizations (NGOs) have developed standards for operations they undertake to avoid haphazard actions during a crisis. These include such tools as the Sphere standards and Humanitarian Accountability Partnership (HAP). These standards offer the framework for operating in a crisis in a protection-sensitive way.

Information

Another level for strengthening protection relates to the acquisition of relevant information and technical support, which are crucial to managing protection issues within refugee crisis. Whether this applies to states in dealing with asylum seekers at border posts or temporary shelters and refugee-camp scenarios, having the right type of information processes and communication systems is crucial to planning and appropriately managing protection issues during a crisis. This process must include decision-making systems that are constantly kept up to date by the organization's crisis management team. As an example, when the Refugee Convention was adopted in 1951, states did not consider xenophobia as a human rights issue. Indeed, female genital mutilation (FGM), which some cultures practiced, would not have been regarded as an issue to feature in the convention to form a basis for claiming asylum. Yet, in contemporary times both FGM and threats based on xenophobic behavior in some cases can constitute a valid reason for claiming asylum. Thus, having the up-to-date information for decision making, through such tools as the United Nations High Commissioner for Refugees' (UNHCR) Refworld, a leading source of information for enabling effective decision making and refugee determination for border systems, may be critical in supporting protection principles for vulnerable persons.

Partnerships and Cooperation

In order to ensure protection is accorded to vulnerable people such as refugees, particularly in times of crisis, forging partnerships with key stakeholders in planning and implementation is critical. The sudden influx of refugees, for example, can be very overwhelming to fragile entry systems and refugee camps, for example; thus, protection can be the first casualty under such a strain. The UNHCR and the European Union have, for example, made an arrangement, Frontex–UNHCR cooperation, with regard to the external border members of the EU. Under this arrangement, the UNHCR contributes to the effective border management system, which is fully compliant with international and EU international protection obligations. Effective planning can assist in achieving an effective refugee status determination system, even under extreme strain. Due consideration and regard for the various interactions in a system, both horizontal and vertical systems, including enhanced cooperation among or with NGOs, can provide very effective mechanisms for effective protection in crisis situations.

Training and Human Resource Development

Ensuring protection is seriously considered even in crisis situations, when it requires crisis management teams to plan for such disruptions in the normal functioning of the humanitarian system through preparedness. The UNHCR, which has the refugee mandate, has its Protection Learning Programme (PLP) for its staff. This preparation enhances the quality of decision making during crisis. This is particularly important given the often sudden disruptions and shifts in the reasons for claiming asylum. In addition to this, previously known grounds for claiming asylum are becoming more complex.

New actors such as armed groups present new challenges to victims and would-be victims, including children and single women, for example. Crisis may be triggered by nonstate actors such as armed groups, which also can have a degree of unpredictability with regard to the resulting nature and time of emergency crisis. Thus, mechanisms for protection in crisis situations, processes for information gathering for capturing human rights violations, and decision making will need constant updating.

Understandably, protection implementation is more likely to have some degree of success in a functioning state. Implementing protection safeguards within fragile and failed states is likely to be challenging, considering the low level of accountability, if any at all, characteristic of the actors. Thus, while the first responsibility of a state is to protect its citizens and those under its jurisdiction, this may not be the case in failed states. In contexts of failed states, vigilance to create mechanisms at the community level by the international community to implement protection, check compliance, and identify violations of human rights, including gathering valuable evidence, becomes extremely critical.

Ultimately, protection in crisis situations demands cooperation from a range of stakeholders, whether they are institutional or community based, local, regional, national, or international. Building the capacity for implementing protection even during crisis requires preparations at the international, regional, national, community, and crisis team levels, often with other relevant stakeholders. Effectiveness in managing protection principles in a crisis situation demands good and proactive processes that can deal with disruptions.

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See Also: Interstate War; Refugees and Forced Migration; Vulnerable Populations.

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Protest

Peaceful protest has been part of life in liberal democracies for a long time. It is an essential safety valve for those who have strong views about something they feel is wrong. The right to protest in public is at the root of two basic freedoms: assembly and speech. These basic freedoms are enshrined in Articles 19 and 20 of the United

Nations Universal Declaration of Human Rights (1948), in the First Amendment of the U.S. Constitution, and in Articles 10 and 11 of the European Convention on Human Rights (ECHR). Thus, under human rights law, there is an obligation to facilitate peaceful protest. The purpose of a protest is to attempt to influence public opinion or the policies of governments or organizations such as those associated with economic globalization, for example, the World Trade Organization (WTO), the International Monitory Fund (IMF), or the World Bank.

Rights of Protest and Security

The maturity of a liberal democracy is often measured by the ease with which peaceful protests are allowed; however, it is also measured by the security in which people are able to go about their lawful business without interference from protesters. Balancing the rights of those who wish to protest with the rights of those who wish to go about their lawful business and with a duty to protect people and property from harm or injury defines the policing dilemma in relation to public protest. Generally, protests take place at locations where they are likely to attract the most publicity. Thus, they tend to occur in large cities, where, unless they are confined to controlled areas such as parks, it is inevitable they will cause some level of disruption. In liberal democracies, public authorities and law enforcement agencies must show a degree of tolerance and discretion toward peaceful protests even if they do cause some disruption or obstruction.

However, this does not mean that governments and law enforcement agencies cannot place any restrictions on protesters. Indeed, they do so, implementing a host of measures designed to reduce the impact of protest such as, in the United States, the use of permits under which the duration, location, and time of protests can be "negotiated" and the introduction of temporary regulations relating to objects that cannot be carried by those participating, and by strictly interpreting existent building codes, fire and insurance codes, and regulations about the handling of food. In the United Kingdom, sections 12 and 14 of the Public Order Act, 1986, give law enforcement agencies the power to impose some conditions on public processions and assemblies.

Although protest has a long history, the antiglobalization movement has recently given it a higher profile, commencing with the events in Seattle in 1999, when a large number of protesters took control of all the major junctions around the Convention Center, thus preventing delegates' reaching it for the opening ceremony of a meeting of the World Trade Organization. Over 600 protesters were arrested, dozens were injured, and there was extensive damage to shops as the protests continued for the duration of the meeting. The city was put under the municipal equivalent of martial law as the mayor of Seattle declared a curfew and oversaw the deployment of the National Guard to support the police.

Prior to the 27th G8 meeting in Genoa, Italy, in 2001, an umbrella group, the Genoa Social Forum, trained activists in self-defense. The Italian government suspended the Schengen agreement, which allows members of the European Union freedom of movement, for the duration of the summit to enable the movement of protesters to be better monitored. It also made the city center an exclusion zone, displacing the protesters—numbering as many as 100,000, many of whom wore protective padding in anticipation of clashes with the police—to the suburbs, where they attacked banks, cars, petrol stations, public buildings, and shops, causing an estimated £15 million damage.

In 2003, thousands of police and military units from France, Germany, and Switzerland were deployed on both sides of the French-Swiss border when the 29th meeting of G8 was held in the French town of Evian-les-Bains. Thousands of demonstrators descended on the French-Swiss border close to Geneva in a bid to disrupt the summit. Denied access to the venue by an exclusion zone, the protesters went over the border into Switzerland, where they caused criminal damage to the value of approximately 3 million Swiss francs. Police and military units from France, Germany, and Switzerland were deployed.

For the 33rd meeting of G8 in Heiligendamm, Germany, in 2007, 16,000 police and 1,000 military personnel were deployed, and a 12-kilometer fence was built around the town at a cost of $16.6 million. Some 5,000 protesters effectively set up a number of roadblocks, cutting off the venue to vehicular traffic for three days. Police resources

Socialists and Democrats in the European Parliament
www.socialistsanddemocrats.eu
S&D
Socialists and Democrats in the European Parliament
www.socialistsanddemocrats.eu

Members of the Socialists and Democrats in the European Parliament protest austerity measures at the Parc du Cinquantenaire in Brussels, Belgium, on September 29, 2010. These anti-austerity demonstrations against high unemployment and European government spending cuts were still taking place as of late 2012, generally in the form of large street protests and strikes.

were deployed by helicopter, and water cannons were used to maintain distance.

As a result of these and other similar protests, some countries—for example, Canada (Kananaskis, Alberta) in 2002 for the 28th G8 meeting, and the United States (Sea Island, Georgia) in 2004 for the 30th G8 meeting—selected isolated locations in order to more easily control protest or even to dissuade protests from being made. More recently, the manner of protest has changed in that organizations like the Occupy Wall Street movement in the United States and Occupy London in England, both of which are broadly protesting economic and social inequality, greed and corruption, and high unemployment, have taken to occupying ground close to symbolic locations for lengthy periods of time.

Crisis Management Perspective

Protest can seriously disrupt the normal everyday work of an organization, particularly if it has premises within an area in which protesters may assemble. Whether it is likely to be either a direct or indirect target of protest, the organization should not rely on the forces of law and order to adequately protect its premises. Instead, it should take steps to ensure that the buildings are secure by installing physical protection against unlawful entry and employ sufficient security personnel to ensure the safety of the contents of the building and its workforce. Alternatively, work should be transferred to another venue away from any likely area of protest. A lengthy protest well away from an organization's operating premises, even in another country, could disrupt supplies of raw materials, and alternative sources of supply should be identified at an early stage.

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See Also: Command and Control; Operational Plans; Operational Readiness; Peacekeeping; Perimeter Control; Religious Violence; Revolution; Riots; Strikes.

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Public Awareness and Education

The Hyogo Framework for Action has identified using knowledge, education, and innovation to build a resilient community and promote disaster risk reduction. The Red Cross has also recognized that response and recovery are not enough to make a community resilient. Because a hazard occurs at a local level, increasing participation of the impacted population in the preparedness and mitigation phases of emergency management will aid in increasing the local community’s ability to cope with devastating consequences of any hazard. Therefore, community-based disaster management, a bottom-up approach more focused at the community level that requires integration and participation of polices and stakeholders at other scales (state level, country level) and agencies, has been identified as the best option for increasing community resilience.

One way of increasing community participation in emergency management is to increase public awareness through education about the problems, possible solutions, and proactive actions. Educational programs should be targeted at the at-risk populations of all demographic/cultural/ethnic groups and the population surrounding the at-risk population, and should include the participation of community leaders, neighborhood associations, organizational leaders, and other key stakeholders, including emergency managers and certain policy makers. A discussion of different modes and tools of education and approaches to ensuring quality of educational material and tools is presented in this article.

Public Communication Approaches

Formal education is the conventional way of increasing public awareness about different topics. It has been found that this mode of education does not accomplish community participation in the case of emergency management and mitigation. One of the reasons for this is that people are reluctant to implement or follow guidelines if they did not participate in the process of formulating those guidelines and mitigation measures. The other problem with such formal education is that very often it does not target the majority of the public unless they are part of an educational system. The Red Cross has suggested using the following modes of education to increase public awareness and subsequent participation in preparedness, mitigation, and resilience.

Formal education: This includes development of curriculum in a school system dealing with different components of hazards, from the origin and attributes of a hazard to consequences and causes of its adverse impacts on society and the environment, and including emergency management. Curriculum development and its implementation are controlled by the education authorities, who are responsible for the long-term sustainability of such courses and are accountable for providing accurate and updated information. The advantage of this approach is that courses can be tailored to different age groups.

Informal education: Unlike formal education, informal education can be provided by any authority/agency, even by a person with experience in disasters and emergency management. Informal education is also attractive to most people because (1) it is not influenced by a specific time frame and the required amount of course material to be covered within a specific time, (2) it does not require students to be of a certain age group or part of a certain discipline or have certain prerequisites, (3) it is comparatively inexpensive, (4) it can be presented using different tools and techniques,

(5) it can cover a large target audience, and (6) it accounts for the needs and concerns of the local audience. Some of the popular modes of informal education are e-learning, games, and World Wide Web resources.

Campaign: A campaign enables providing standard information to a large audience at one time. It also provides the opportunity to present a wide range of information in formal or informal gatherings of publics of varying age groups, experience, and ethnicity. Some of the traditional methods of a campaign include workshops, seminars/webinars, face-to-face presentations, presentations through mass media, publications in magazines/mass media/the Internet, billboards, flyers, and brochures.

Participatory learning: This approach encourages participation of people in the problem resolution process, thereby leading to their acceptance of possible guidelines and solutions. Because of the involvement of the public, solutions devised to problems through this process often include local knowledge, which otherwise is not possible. Given that community-based emergency management has been recognized as a more acceptable method of increasing community preparedness and resilience, this technique increases community empowerment.

Some of the techniques used to accomplish participatory learning are participatory action-oriented research (communities are involved in the research stage to determine solutions), evaluating mitigation plans through drills and simulations, and training community leaders and stakeholders in risk reduction and response measures. Because hazards occurs at the local level, this type of learning works best if applied at the local level (individual or community level), but other levels that should be part of the learning process to increase interaction and build trust are county/state-level emergency management agencies and other organizations that are part of the emergency management team: fire departments, law enforcement agencies, schools/churches, and businesses.

Tools and Techniques

A number of tools and techniques are currently used to educate people about hazards, their different components and consequences, and approaches to mitigate societal and environmental impacts of hazards on communities. Though each tool can be used effectively, each community comprises demographically/ethnically/culturally diverse people. Using a combination of the following tools, depending upon the needs of a community, will be more effective in increasing public awareness about causes and consequences of hazards and increasing community resilience.

Publications: Publications have always been an accepted form of disseminating information and increasing public awareness. Although publication in the form of print materials has been widely used, technological advancements have made it possible to publish information in digital format for a larger audience. Depending upon the type and amount of information and the target audience, different types of published materials can be used, which include magazines, brochures/flyers, booklets, bookmarks, guideline books, activity books, posters, banners/billboards, comic/coloring/story books, DVDs/CDs, and Web sites with information pages. Irrespective of the type of publication, the material should be informative and interactive to make it memorable and to induce behavioral and activity changes to increase preparedness and resilience.

Presentations: Traditionally, curriculum, educational, and training modules; academic/professional presentations; workshops; Webinars and seminars; and focus group meetings are used to provide a large amount of information in a structured format to a large audience in a face-to-face meeting at one time. The target audience for these methods can comprise teachers, students of different age groups, community members, emergency managers, and other stakeholders. Because these methods of dissemination enable interaction between information provider and recipient, recipients tend to learn through exercises, and providers can test the learning outcomes of the approaches to increase effectiveness of future such meetings. For any of these methods to succeed, it is imperative to know the prior knowledge, skill set, and competency of the recipients.

Electronic learning: Electronic learning, or e-learning, unlike the traditional classroom style of teaching, uses computers, the Internet, and DVDs/CDs to provide information to a larger audience. Game-based educational modules are also good examples of e-learning techniques.

The advantages of using this technique are (1) learning materials can be accessed at any time, (2) instructors can share knowledge and be available to provide information at any time, (3) students learn the information at their own pace, (4) students can interact with the modules to understand a problem and devise their own solutions and find out the impacts of the solutions, (5) it is less expensive, and (6) because learning materials can be available in textual/audio/video/game format, students can learn the material using any of the available options as they prefer. The dependence of this technique on information technology is its major drawback. People who lack access to a computer or the Internet cannot use the tool for learning.

Arts: Events and locations supporting mass gatherings—for instance, an exhibition, public parks, school and community events, recreational centers, or fairs—can be used to increase public awareness about hazards and their adverse impacts. Some of the artistic outlets that can be used to reach a broader audience and encourage participants of all age groups to participate are dramas, skits and plays, puppet shows, murals, large-scale paintings, and posters. One major advantage is that these methods of dissemination can be conducted formally and informally.

Games: Game-based learning has been found to be effective in increasing (1) student participation in a problem-solving task, (2) a student's knowledge-receiving capacity, (3) student motivation to learn, (4) student perception of the problem, and (5) learning outcomes. Being innovative and interactive, games enable students to understand a problem and learn about fundamentals of dealing with the problem, to use their skill set to solve the problem, and to evaluate the consequences of each solution.

Examples of different games that can be used to increase public awareness include board games, puzzles, video games (2D or 3D), and interactive educational games that have an exam component. Disneyland in Orlando has a 3D game that mimics a hurricane and allows children to learn about hurricanes, causes of their origin, and their consequences on society and the environment. As games can be designed to target any age group, these are a good way to increase public awareness and participation in emergency management.

Audio and video: Learning materials in audio and video formats can be mass produced and used by a large group irrespective of ethnic/cultural/linguistic diversity. These materials can be produced either professionally or informally by an experienced person. Professionally produced materials can be expensive and would be useful in public relations work. Because professional materials tend to be more generic, they provide a broad-based coverage of a problem, available concepts, and possible solutions and hence implement a problem-based learning technique. Informal and locally produced materials can be inexpensive, comprising personal experience, and therefore are a good platform to share information. Informal materials can also build on local knowledge, which tends to be lacking in professionally produced materials. Because informal materials account for the characteristics of a community and aid people to use their knowledge in conjunction with generic information to resolve a problem, they are more place-based. Furthermore, informal materials can also be published using radio and local television networks and the Internet (podcast/YouTube/social media sites).

World Wide Web: Growth and increasing usage of the World Wide Web has made it possible to disseminate information to a large audience and promote public awareness and education. Using Web resources requires developing a site that is simple, provides a lot of information without being bulky in its implementation, and can provide the same information in different languages. Decision support tools can also be published using the Internet to aid users in solving a problem based on information provided through these tools. In order for the site to be acceptable to users, it has to be transparent, be consistent, provide updated information, maintain privacy and confidence of the users, and be accountable to provide accurate information. E-learning modules and games can also be disseminated through the Web. The successful use of Web-based resources is dependent on the availability of the Internet.

Social media: Social media have become the forefront of communication. Though e-mail is still in use, social media sites allow instantaneous access to information. For instance, Ujahidi and Twitter were used during the Haiti earthquake to share information among stakeholders. These sites also allowed users to translate information into English so that response and rescue teams on-site could use the local knowledge to respond to problem areas and aid in recovery. These sites enable people to build a broad network and to share information without any organizational involvement. They also work as a source of social capital for communities so that people can reach out to others and build trust to share information. These sites can also be used for collaboration, knowledge sharing, and broadcasting of information to a larger group following a snowball approach.

Telecommunication: The use of cellular technology has made it possible to provide information to the public irrespective of their location. The same technology can be used to provide information about a disaster at any stage of emergency management. In the United States, the Federal Emergency Management Agency (FEMA) uses this technology to warn the public of an impending disaster. E911, another such telephone-based service in the United States, allows locating a caller's position to send a response. New programming technologies have been developed to design resources using the Internet that can be accessed from a phone instead of a computer. Thus, the games and Web-based resources that provide information about a disaster can be designed to be accessed by a phone. As cell phones are more prevalent than computers in developing countries, it is a much better option for contacting a large audience using a mode of communication to increase public awareness.

Quality and Sustainability Assurance

Irrespective of the different modes of education and tools to deliver information, it is essential to evaluate whether the methods of dissemination are successful and will be long-lasting. This requires evaluating the quality of information and of required steps to increase sustainability of dissemination methods. The following sections present a discussion of the principles to be followed to maintain quality of information and steps to evaluate success of education modes.

Consistency: Extensive studies have been conducted in hazard research about crafting messages and information. In order to attract the attention of the public and increase its acceptance of information, it is pertinent that the information presented to the public is clear and consistent. The public should be informed of the causes of risk, who is at risk, the social/financial/environmental consequences of risk, and the actions to be taken during different phases of emergency management to address the adverse impacts. Presenting scenarios and real-life examples of the results of not taking any mitigation measures will also help people understand the significance of the information presented to them.

Scalability: Hazards and risks occur at the local scale. Therefore, community-based education and intervention have been recognized as the most successful approach to increasing public awareness. With rapid population growth and constantly changing dynamics of communities, it is crucial to develop activities and educational modules that can be applied to a large group of people to save cost and time of preparing materials. In this context, scalability comes into the picture, which means replicating the same activities on a larger scale or for a larger audience. One approach to developing cost-effective and sustainable solutions that can be replicated easily is to develop modules of generic information about a specific problem and potential solutions, then change the modules to adapt to a community's need. This will help address the changing dynamics of the same community over a period of time as well as integrate local knowledge.

Sustainability: Even if education intervention is effective and public awareness has increased, communities are increasingly at risk. One major reason is that each community undergoes population growth and subsequent changes in social and physical environments, as well as in- and out-migration, thereby leading to a constant change in the community's dynamics. Other changes that a community might undergo are (1) formulation of new policies/guidelines that require developing a new solution different from previous solutions, (2) changes in technologies that might provide a better solution, (3) technological changes that might intensify a current problem, (4) inclusion of new indigenous knowledge, and (5) lack of evaluation of previous education approaches. Therefore, public awareness education needs to be sustainable, that is, it will be useful and less expensive to identify activities that can be replicated without significant changes, to identify agencies that can provide these education sessions, and to conduct predictive models to identify people and locations at risk to develop appropriate solutions.

Legitimacy and credibility: Legitimacy and credibility are two important facets of public awareness education, that influence both acceptability of educational material and public awareness and resilience. Legitimacy ensures providing regulated and quality information. Credibility means building trust with the public to make them believe in the information as well as in the information provider. By increasing the involvement of local stakeholders, credibility of information can be achieved. Likewise, legitimacy can be injected into the material by asking national-level staff and volunteers to be part of the material development and dissemination. For instance, FEMA providing education on emergency management will be legitimate, but including local leaders will increase credibility and acceptance of material at the local level.

Information content, design, and delivery: The goal of any mode of education is to increase public awareness and reach a broader audience, which means addressing the experience and knowledge of local participants in information formulation. Chances of people having any knowledge of technical terms used in the information are low. Therefore, it is best to avoid the use of jargon and technical terms when disseminating information to the public and most beneficial to use everyday language instead; for instance, "there is 30 percent chance of rain today" versus "there is a one-third probability of rain." People use "percent" in day-to-day life as opposed to "probability," so using "percent" in the information will be more understandable.

Instead of using only textual information, visual information should also be presented. Pictures (e.g., photos, maps, figures, etc.) attract more attention and can be interactive. In case of the presence of a linguistically diverse audience, pictures can be used to inform them of a problem and potential solutions. Pictures of adverse impacts of hazards as well as positive outcomes of proactive action should be presented to motivate the audience to take action to mitigate future hazard impacts. Geospatial technology has made it possible to visualize the spatial distribution of hazards, at-risk populations, and adverse impacts of hazards. Therefore, maps depicting this information should be used, but it is essential to use a color scheme that works best. Maps should include landmarks for easy interpretation.

Educational material should include local knowledge. Prior experience of the public, especially community leaders and key stakeholders, in dealing with hazards should be addressed in the material. Adapting the information to a community not only will increase public interest but will also provide the advantage of using local knowledge along with generic information in dealing with different situations.

Rather than just presenting information or lecturing on the information, it is essential to present it in an interactive manner. In addition to the presenter, community leaders and key stakeholders in the community and emergency managers should be present during presentations. This will build the trust of the public and lead them to believe in the material. Engaging their attention and asking their participation in understanding the problem and potential solutions is another way to increase acceptability of information and to motivate audiences to take action to reduce future hazard impacts.

Finally, the tools should be interactive, user friendly, easy to use, accessible, and informative. Information content should also be updated, consistent, creative, and participatory. Content should be evaluated by experts and local stakeholders. Pre- and post-test surveys can be used to determine people's knowledge gain and inclination to take proactive actions to resolve a problem. Drills can also be conducted to test the effectiveness of materials and public awareness. These approaches, if successful, can be replicated.

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See Also: Crisis Communications; Coping Capacity and Response Capability; Decision Support Tools; Disaster Risk Reduction; Electronic Media; Emergency Management Agencies, City and County; Federal Emergency Management Agency (FEMA); Mass Media; Social Media.

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Public Health Surveillance

Public health surveillance is defined by the World Health Organization (WHO) as the ongoing, systematic collection, analysis, and interpretation of data (e.g., regarding agent/hazard, risk factor, exposure, health event) essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control. A public health surveillance system should include the capacity for systematically collecting data, analyzing said data, and disseminating results to persons who can implement effective interventions.

Understanding Public Health Surveillance

Public health surveillance delivers real-time, early warning information to health practitioners and decision makers about health problems that need to be addressed in a discrete population. It is a critical tool to prevent outbreaks of diseases and develop appropriate, rapid responses when diseases begin to appear and spread.

Public health surveillance provides information such as the following:

- Disease incidence, morbidity, and mortality, as well as progress in achieving disease control goals
- Changes in patterns of morbidity and mortality among and within different age groups, demographic areas, and economic, social, or cultural groups
- Impact of various control measures (such as immunization and vaccination strategies) on disease incidence

Tracking of Overall Disease Trends

The overriding value of disease surveillance is its use as a tool to identify the presence of infectious diseases and to guide actions to prevent them from becoming threats to public health. Surveillance is also necessary in a public health setting as it can serve as an early warning system, identify public health emergencies, guide public health policy and strategies, and document the impact of an intervention or progress toward specified public health targets/goals as well as understanding/monitoring the epidemiology of a condition to set priorities.

Case Study: Public Health and Sudden Acute Respiratory Syndrome

The epidemic/near pandemic of sudden acute respiratory syndrome (SARS) appears to have started in Guangdong Province, China, in November 2002. The first case of SARS reportedly originated in Shunde, Foshan, Guangdong, in November 2002, and the patient, a farmer, was treated in the First People's Hospital of Foshan. The patient died soon after, and no definite diagnosis was made on his cause of death. Despite taking some action to control the outcome, Chinese government officials did not inform the World Health Organization (WHO) of it until February 2003. This initial lack of openness caused delays in efforts to control the epidemic, resulting in criticism of the People's Republic of China from the international community. China has since officially apologized for early slowness in dealing with the SARS epidemic.

The first clue as to the true nature and scope of the outbreak appears to be on November 27, 2002, when Canada's Global Public Health Intelligence Network (GPHIN), an electronic warning system that is an element of the WHO's Global Outbreak and Alert Response Network (GOARN), picked up reports of a "flu outbreak" in China through Internet media monitoring and analysis and sent them to the WHO. Subsequently, the WHO requested information from Chinese authorities on both December 5 and 11. Public health control measures were put into place soon afterward because of the fear that this disease could potentially be spread from person to person.

Even so, in February and March 2003, the disease spread to Hong Kong, Vietnam, Singapore, Canada, and elsewhere. Health experts named it severe acute respiratory syndrome (SARS), identified a specific virus as the cause by March 2003, and mapped the full genome by April.

After more than 8,000 patients in 26 countries were affected and 774 deaths were confirmed, the pandemic ended by July 2003, as transmission was interrupted. The World Health Organization spearheaded the effort to control the pandemic, working with national and international health workers, the Chinese Center for Disease Control, and a team of field epidemiologists.

In Canada, which had the most cases of SARS outside China, field epidemiologists began investigations, developed prevention and control guidelines, informed the media and the public, and planned and implemented studies of the disease.

The success of this global effort to control the first new epidemic of the 21st century depended on open collaboration among scientists and politicians of many countries and on rapid communication of surveillance data among countries. Once the spread of SARS was recognized, a worldwide surveillance network was established based on an agreed-upon case definition that was specific enough to ensure accurate reporting.

With the advent of travel pathways allowing millions of people to travel the globe every day, diseases cross boundaries within days and sometimes even hours. Recent experiences such as the severe respiratory acute syndrome (SARS) near-pandemic in 2002–03 as well as the H1N1 pandemic in 2009–10 have shown the need for robust public health surveillance systems because of multiple factors (health and economics, specifically). Although the tools and expertise exist to avert epidemics, political commitment and financial support are needed to ensure that all countries have systems in place to detect, analyze, and respond to diseases as soon as they emerge. Given this, public health surveillance needs to be grounded in a functioning and organized health care system within a stable governmental structure. As a corollary, public health surveillance remains rudimentary or simply absent in many parts of the world where governments function poorly. Public health surveillance rests on clear classification of illness and disease and relies on accurate, replicable measurement systems that incorporate both the collection of data systematically, and its timely analysis and consistent interpretation.

Types of Public Health Surveillance

There are several types of public health surveillance. These include the following:

Laboratory surveillance: Some conditions, especially chronic diseases such as diabetes mellitus, are routinely managed with frequent laboratory measurements. Since many laboratory results, at least in Europe and the United States, are automatically processed by computerized laboratory information systems, the results are relatively easy to inexpensively collate in special purpose databases or disease registries. Unlike most syndromic surveillance systems, in which each record is assumed to be independent of the others, laboratory data in chronic conditions can be usefully linked together at the individual patient level. If patient identifiers can be matched, a chronological record of each patient's laboratory results can be analyzed as well as aggregated to the population level.

Sentinel surveillance systems: These consist of a sample of health facilities or laboratories in selected locations that report all cases of a certain condition to indicate trends in the entire population. Sample reporting is a good way to use limited resources to monitor suspected health problems. Examples include networks of health providers reporting cases of influenza or a laboratory-based system reporting cases of certain bacterial infections among children.

Syndromic surveillance: This applies to surveillance using health-related data that precede diagnosis and signal a sufficient probability of a case or an outbreak (or cluster) to warrant further public health response. Though historically syndromic surveillance has been utilized to target investigation of potential cases, its utility for detecting outbreaks associated with bioterrorism is increasingly being explored by public health officials and emergency medical services (EMS) leadership. *Syndromic surveillance* is the term for the active monitoring of a disease cluster or clusters.

Uses of Public Health Surveillance Data

There are many uses for the data culled from public health surveillance. These include assisting in evaluating the magnitude of the public health problem, determining the geographic distribution of illness, portraying the natural history of a disease and/or disease process, detecting epidemics/defining a problem, generating hypotheses and stimulating research, evaluating various public health control measures, monitoring changes in infectious agents (the aforementioned SARS and the H1N1 events are both good examples), detecting changes in health practices, and facilitating future health event planning.

Additionally, the following are areas where public health surveillance could also be helpful:

- Monitoring the adverse effects of environmental hazards such as toxic chemicals and biologic agents in the air, water, soil, or food.
- Collecting data on injuries, which are among the leading causes of death and disabilities worldwide, and most of which are preventable.
- Detecting and managing outbreaks of bioterrorism, in which the causes are human-made but the outbreaks are similar to other epidemics. Early detection and warning are critical to saving lives.
- Monitoring and responding to disasters and complex emergencies, including mapping of possible hazards and training of rescue teams.
- Monitoring refugee populations to identify and eliminate preventable causes of illness and death in these communities.

Conclusion

One of the most important points in public health surveillance is the information loop of public health surveillance. This means that information will be gleaned from the way that the public present to physicians/health agencies/health departments and then be processed into reports. These reports, with various trends, summaries, and recommendations, will be sent to other physicians/health agencies/departments, and the cycle begins again.

The practice of public health surveillance and disease notification is becoming more sophisticated not only in the United States but throughout the world. The use of computers is making reporting quicker and more accurate, and it supports more sophisticated analysis of the data. Improving laboratory support by means of more rapid and detailed identification of etiologic agents has also increased the effectiveness of disease reporting. Surveillance, which consists of collection, analysis, interpretation, and eventual dissemination, leads to public health actions, including priority setting, outbreak investigation, and case investigation as well as prevention and control.

To be useful, public health surveillance must be approached as a scientific enterprise, applying rigorous methods to address critical public health concerns. The problems facing the developing and developed worlds are increasingly similar and overlapping. The rise of global epidemics, in particular, calls for integrated, worldwide networks that bring together health practitioners, researchers, governments, and international organizations to address surveillance needs that cross national boundaries. Although it is reassuring that disease outbreaks such as H1N1, SARS, and even Ebola have been impacted, rapidly identified, and possibly mitigated, through rapid surveillance and response, there is no reason for complacency.

Health experts are certain there will be further outbreaks, possibly of SARS or avian flu, or some novel disease as yet unseen. Thus, the question is not whether but when these new disease outbreaks will occur and whether the worldwide health community will be ready for them.

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See Also: Centers for Disease Control and Prevention (CDC); Cluster; Epidemics; Pandemics; Severe Acute Respiratory Syndrome (SARS); World Health Organization (WHO), UN.

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Public Image

Public image is how people feel and think about a particular organization, regardless of facts sometimes. Companies and organizations portray and characterize themselves through marketing campaigns that indirectly tell the public how they should feel about said company. How well an organization manages a crisis will directly impact its public image and will alter how people feel about the organization and its products. Maintaining a positive public image is often a selling point for a crisis management program.

Crisis Communications Strategies

The most difficult part of managing a crisis is reacting with the appropriate response in the eye of the public. There are several things that can be done by a company in crisis to publicly manage its reputation.

Taking responsibility for the crisis is necessary to avoid being seen as defensive and portraying an uncaring attitude. During times of crisis, the impacted company should strive to assist with efforts to find the cause of the crisis versus defending an innocent status. If possible, every effort should be made to correct the problem immediately, regardless of fault. If there are victims, it is important to give them and their families special treatment and genuine sympathy. Conversely, a company in crisis may play the role of the victim while also recognizing and fixing the issue. This can gain the public’s sympathy and make the public cheer for its success in recovery.

Every attempt should be made to be proactive with the media. This should start before a crisis occurs by identifying a media spokesperson in order to form a trusted relationship. One spokesperson should be identified to be the face for the company during this time. Only facts should be mentioned when discussing the crisis, rather than speculation, assigning blame, or downsizing the impact of the crisis. Social media should not be ignored. Organizations need to designate someone to monitor what is being said about the crisis and the company in order to immediately counter any erroneous information with the correct facts. All available social media platforms should be used in order to get the message out to the most people.

Case Study: Examples of Positive and Negative Public Images During Crises

Common opinion equates with a quick and honest response; often, accepting responsibility, even if the situation was not caused by the company in crisis, is the most effective strategy for maintaining a positive public image after a crisis. A company that is silent during crisis or puts blame on another entity is usually ostracized by the media and the public at large.

Tylenol Tampering

Tylenol (Johnson & Johnson) underwent a product tampering crisis in 1982 in which it fared well with its public image. The company was faced with the dilemma of the best way to deal with a problem outside its control without destroying the reputation of its brand and its most profitable product. Johnson & Johnson's approach to the crisis, including its readiness and willingness to respond, created a favorable positive image for its brand in the long run.

In short, a murderer took Tylenol bottles from stores' shelves, added cyanide, and returned them back to the shelves to be sold to the general public. Seven people were killed by taking the Tylenol capsules. When the deaths were traced to Tylenol, Johnson & Johnson responded immediately by recalling and destroying 31 million capsules at a cost of $100 million. It is now known that there was no wrongdoing or shirking with safety on behalf of Tylenol; however, the public saw Johnson & Johnson take responsibility for the crisis. The leadership appeared immediately in the media and at news conferences ready to talk about the situation. Tylenol sales regained as people trusted the company because of its proactive response.

Deepwater Horizon Explosion

A BP-owned oil and gas prospect that operated off the Gulf Coast suffered an explosion and subsequent oil spill in 2010. The explosion killed 11 men working on the platform and 17 others. Oil continued to spill into the Gulf of Mexico for months. The spill caused extensive damage to marine and wildlife in the Gulf and impacted both the fishing and tourism industries. The incident has turned into a classic case study of how not to manage a crisis, as BP quickly became and remained loathed by the public. BP was very slow to acknowledge the crisis in the beginning. It consistently underestimated the severity of the situation and put blame on any other organization when possible. Furthermore, it failed to show empathy toward the victims and the victims' families. All of these combined led to an outpouring of outrage from the general public.

Public Image Is the Crisis

There can be circumstances when poor management of one's image becomes the crisis that could lead to the demise of a company. With the popularity of social media and the instant mass communication capability of videos and texts, companies must be on alert to ensure they are aware of their company's involvement in these platforms. Many vendors currently exist to monitor media sites on a company's behalf. These vendors provide clients with copies of media content that is of specific interest to them and can change based on current demands or a change in situation. They can deliver multiple items such as documentation, content, analysis, or editorial opinion. These services may specialize in subject, industry, size, geography, publication, journalist, or editor. The 24/7 monitoring of blogs, social networking sites, and various news sites is essential to protecting a company's image in today's world. With proper detection and communication with a crisis management team, an appropriate response can be formulated and implemented to rectify the situation.

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See Also: Credibility; Crisis Communications; Electronic Media; Mass Media; News Media; Product Defects and Recalls; Product Tampering; Public Relations; Reputational Risk.

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Public Relations

From the perspective of traditional areas of practice and scholarship, the field and study of public relations is relatively new in the communication and management fields. It is an eclectic term that generally defines the relationship between an organization and its stakeholders, operationalized as management, communication, and social functions. At its most fundamental level, public relations professionals communicate on behalf of organizations to favorably position them to earn the trust and favor of targeted markets, stakeholders, and other audiences.

Most classic definitions of public relations are structured around the concept that it is a management function that establishes and maintains mutually beneficial relationships among an organization/industry/client and its related publics on whom its success or failure depends. The Public Relations Society of America defined public relations as a field that helps an organization and its publics adapt mutually to each other. A more general definition of public relations is that it is a management function that entails planning, research, publicity, promotion, and collaborative decision making with stakeholders on behalf of an individual or organization to improve its ability to listen, appreciate, and engage in dialogue and management decisions to reach its goals and objectives and ultimately to achieve its mission and vision.

The term *public relations* first appeared in the 17th century, but the professional practice as it is known today is a product of the latter part of the 19th century in the United States, primarily in the role of press agentry and promotions. The 20th century witnessed the professionalism of public relations while defining itself with sets of best practices, ethical codes of conduct, standards of higher education that prepares future practitioners, and the development of an academic body of knowledge that is culturally critical and empirically refined, tested and debated in application, theory, and social responsibilities to society.

The First Amendment ultimately protects public relations' roles in the United States, giving the right of natural and artificial citizens to speak and to hear, to read, and to view what others say. In this manner, public relations is a way for people and their related organizations to be involved in the marketplace of ideas. Ideally, it allows people to share and to understand ideas before making a choice. This communication is enacted not only in discourse but also within the actions of organizations, which are communicative roles that impact the discourse of society. Thus, at its core, public relations is fundamentally about creating and enacting meaning on behalf of organizations. The richness of public relations research and practice is based on interpretation and advocacy beyond simple information push and exchange, while addressing how meaning is created, exchanged, and enacted in ways that make individuals and organizations more effective at what they do and fostering decision making for a fully functioning society.

The strategic planning function of public relations positions organizations to engage in dialogue with stakeholders regarding issues, products, or services. Planning involves counseling management's actions and communications to better understand and to align their interests with those of their stakeholders. Public relations uses research to obtain data that can be used to better plan, identify key targets, and measure the effectiveness of management's decisions and related communication actions. Public relations research works to environmentally scan media and other communication outlets and define threats and opportunities that exist for the organization and its related stakeholders, both internally and externally. Public relations activities and plans are designed to support an organization's overall numerous goals and objectives. Communication efforts are typically related to promotion and publicity and issues management, including new media platforms such as social media. Practitioners are tacticians and technicians who design and craft communication tools, as well as counselors who advise organization management on how to best fit into their operating and community environment.

Public relations as a communication function has a general model that includes four steps: research, action, communication, and evaluation. One historical model and contemporary description of public relation practice is the four models of public relations, developed by James Grunig. The first model, press agency/publicity, defines public relations as a propaganda tool that seeks media attention. The second model, public information, describes public relations as journalists-in-residence who avoid negative information and disseminate general factual information about an organization to targeted publics. The last two models are two-way asymmetrical and two-way symmetrical. The two-way asymmetrical model works to influence publics without necessarily changing the organization's behaviors, while the two-way symmetrical model works to make the behavior changes that benefit both the organization and stakeholders. Numerous research reports show that public relations practitioners are actively seeking two-way symmetrical communication because it can build better relationships that lead to greater organization effectiveness, higher profits, and better ethics.

Public Relations Functions and Perspectives

Public relations has grown into a mature and important field, and it impacts many other fields, such as emergency management, health care, nongovernmental management, government public education, politics, marketing, and advertising. There are numerous terms that relate to public relations, such as corporate communication, public information, community relations, integrated marketing communication, and public affairs. Much of the early research on public relations concentrated on making organizations more effective by engaging in various public relations functions, including media relations, investor relations, community relations, risk and crisis communication, employee/member relations, government affairs, image management, industry relations, issues management, labor relations, and support of marketing and advertising. These functions are carried out through the use of various public relations tactics, such as press releases, press conferences, media kits, special events, speechwriting, social media, crisis communication planning and execution, and public relations campaigns.

There are numerous competing views about what public relations does, how it should be practiced, and what academics should focus on in their research. Some public relations practitioners' and researchers' perspectives feature "media relations" as the fundamental function of public relations. This perspective follows a more traditional, media-centric perspective on communication more related to marketing and free advertising of products, services, and issues, as well as managing communication during a crisis event.

A second perspective, "communication studies/rhetoric," features concepts such as discourse, dialogue, persuasion, dialectic, sense making, and meaning making. Rather than an information- or relationship-exchanged perspective about the core function of public relations, this orientation is more focused on advocacy, interpretation, and social construction and shared meaning among organizations and stakeholders. The rhetorical tradition is associated with a concern for public discourse, argument, and the character of the communicators—a value on public discussions based on the idea that this process enables the most just ideas to emerge.

Another perspective is "relationship management" as the guiding principle of public relations. Relationship management draws on interpersonal communication to better manage relationships for the good of organizations, stakeholders, and society. Another perspective is a general "strategic management function" with its roots in systems theory. Operating from management theory perspectives, this area applies management procedures to produce mutual benefits and mutually beneficial relationships for organizations,

An ABC News *crew led by Jeffrey Kofman, center, reports a* Good Morning America *segment from the bow of a U.S. Coast Guard cutter about a mile from the explosion of the BP-owned Deepwater Horizon in the Gulf of Mexico, July 9, 2010. During the crisis, the public was deluged with images of the oil spill and environmental damage. In the opinion of the public, BP did not respond quickly enough, fully understand the severity of the crisis, or show appropriate sympathy for the victims, leading to a public relations nightmare for BP.*

individuals, communities, and other publics. Various grounding principles of efficiency of rationale market, efficiency management systems, and participative and collaborative management processes are included. The goal of public relations is not only to maintain relationships but also to strategically and effectively maintain relationships for the betterment of all parties involved. Last, another broad area focuses on "critical/cultural" and "postmodern" perspectives of public relations functions and activities.

Crisis Communication and Public Relations

The industrial and information ages have created a whole new range of risks and crises, while advances in communication and information technologies have increased people's awareness of these challenges, as well as increasing the opportunities for dialogue and shared decision making. Risk, crisis, and ultimately disaster are the definitive challenge to public relations practitioners who research or work for organizations, as well as their related stakeholders, whose business, political, or social missions involve managing health, safety, and environmental risks. Public relations and crisis communication management before, during, and after a crisis can mitigate the effects of—or perhaps prevent—the crisis from becoming an issue by working quickly and responsibly to establish or reestablish the level of control desired by relevant stakeholders.

Beyond better managing health, safety, and environmental implications of crisis events, reputation in large part is based on whether or not stakeholders consider the organization will meet their expectations of how they treat stakeholders. Stakeholders evaluate the organization through information they recruit by interacting with the organization, reading news reports, and hearing secondhand information from other people or from social media. Therefore, when stakeholders lose their confidence in an organization, the organization experiences a reputation threat. In the public relations field, numerous crisis communication theories' and models' response strategies provide frameworks for understanding how to better manage communication before, during, and after a crisis. It is public relations work to conduct the information flow and to update the stakeholders during a crisis, all in an effort to mitigate health and safety effects while managing reputation.

Public Relations as a Social Function

Some researchers and practitioners argue that public relations needs to be studied as a social phenomenon in order to understand its role in building trust or creating mistrust, as well as developing or destroying a company's reputation and legitimacy to operate. The main aspect of a sociological perspective on public relations is its concern with issues and values related to the public sphere, which are publicly debated. Publics and groups are creators of meanings and, ideally, public relations makes it possible to agree to shared meaning, interpretations, and goals. Several scholars have argued that a functional approach along with a co-creational approach to public relations contributes to a society where people, groups, and organizations have desire and confidence to make their community, society, and world a better place to live.

Another social function of public relations is the area of corporate social responsibility (CSR). Within crisis communication and public relations, CSR is essentially a matter of knowing what is expected to help rather than harm others when it comes to crises. In this sense, CSR requires the willingness and ability to meet others' expectations regarding how our actions—what we know, how we act, how we communicate—can add value to others' longing and efforts for health and safety; or how it can also harm that goal, even increasing the likelihood that others' risk outcomes are augmented by our actions and statements, or the lack of action or statement, or when those statements are used as a coping strategy for reputation risk. Conventional wisdom reasons that appropriate operations defined by high CSR standards can help defend an organization during a risk or crisis event, or they can also be its downfall. CSR requires normative behavior, in the sense of social exchange theory, whereby organizations meet or exceed the expectations preferred by stakeholding critics. As an organization meets or exceeds the normative expectations others hold of it, it enjoys a high reputation and likely benefits in numerous ways.

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See Also: Crisis Communications; Emergency Public Information; Reputational Risk; Spokesperson, Designating and Utilizing; Stakeholders.

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Public Safety Canada

Public Safety Canada (PSC) was created in 2003 to ensure coordination across all federal departments and agencies responsible for national security and the safety of Canadian citizens, but it did not become legally established until the Department of Public Safety and Emergency Preparedness Act came into force in 2005. With its headquarters in Ottawa, PSC develops national policy, standards, and response systems in order to reduce the impact of a wide range of crises, including natural disasters, industrial accidents, terrorism, and computer viruses. Recognizing that emergency management is a core responsibility of the government of Canada and a collective responsibility of all federal government institutions, PSC takes steps to promote a coordinated approach and a uniformed structure to the management of emergencies by providing guidance to federal government institutions on the development of emergency plans.

It works closely with provincial and territorial emergency management organizations and the emergency services across Canada and supports its regional partners and responders with funds, tools, and training. The department is made up of five branches—Emergency Management and National Security; Policing, Law Enforcement and Interoperability; Community Safety and Partnerships; Corporate Management; and Strategic Policy—plus the Inspector General of the Canadian Security Intelligence Service. In addition, it has 11 regional offices and two satellite offices across Canada.

Two Key Branches

Although all parts of PSC can be said to influence or be involved in crisis management in one way or another, two of the branches have a more direct impact. The first is the Emergency Management and National Security Branch, which is responsible for both national security and emergency management policy, emergency analysis, warning preparedness, response, and recovery. The branch includes the Government Operations Centre (GOC), the Canadian Cyber Incident Response Centre (CCIRC), and the Canadian Emergency Management College (CEMC).

The second branch is that of Policing, Law Enforcement and Interoperability, which, among other things, is responsible for ensuring that agencies and government organizations share the right information at the right time to keep Canadian citizens safe. In recent years, PSC has assisted in the implementation of the Canada Public Safety Information Network (CPSIN), which is a network for Canada's criminal justice system and law enforcement agencies, linking various sources of data relating to crime and offenders. PSC is now building on this network in order to bring about greater interoperability in health, safety, crime, and national security.

The GOC is at the center of the national emergency management system, monitoring and coordinating, as it does, the federal response to any crisis. In so doing, it is assisted by its regional and satellite offices, which act as PSC's representatives closest to any crisis or event of national interest; they also provide operational support to the Government Operations Centre.

The CCIRC is responsible for monitoring and providing mitigation advice on cyber threats and coordinating the national response to any cyber security incident, particularly if it is likely to affect the national critical infrastructure.

The CEMC is a federal government learning institution providing programs and resources to the emergency management community across Canada. The college is an integral part of PSC and supports its responsibilities to enhance learning in all aspects of emergency management.

Emergency management in Canada is largely governed by the Emergency Management Act, which came into force in 2007. Under this act, the minister for public safety and emergency management is responsible for exercising leadership relating to emergencies in Canada by coordinating government institutions, in cooperation with the provinces and other entities, in emergency management activities. The act lays down the responsibilities of all ministers who are accountable to Parliament for the preparation of plans in regard to risks identified in their respective areas of responsibility, and it emphasizes the need to train people to implement the plan and test it by way of exercises. In addition, the response to emergencies in Canada is based on two documents: *An Emergency Management Framework for Canada* and the *National Emergency Response System*, both of which were published in 2011. A third document, *Building Resilience Against Terrorism*, also published in 2011, provides an overarching strategy to counter domestic and international terrorism in order to protect Canada, Canadians, and Canadian interests. The strategy operates through four mutually reinforcing elements: prevent, detect, deny, and respond.

Bringing together experts from across government and academia, Public Safety Canada promotes research on issues that affect the safety and security of Canadians, which allows them to better understand the risks Canadians face, such as crime or natural disasters, and to develop knowledge-based solutions. In the context of disasters and emergencies, research has resulted in a Canadian Disaster Database, a Natural Hazards Map of Canada, and various reports relating to cyber tracking, emergency response, natural hazards, and situational awareness.

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See Also: Cabinet Office, UK; Department of Homeland Secretary (DHS); Federal Emergency Management Agency (FEMA).

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Publicly Available Specification (PAS) 200

In September 2011, the British Standards Institution (BSI) published a Publicly Available Specification (PAS) under the title "Crisis Management: Guidance and Good Practice," commonly known as PAS200. Sponsored by the United Kingdom Cabinet Office (UKCO), the document was drafted under the watchful eye of a steering group consisting of people who were or had been involved in the management of crises, among them representatives from the Bank of England, travel company Thomas Cook, the UK Airlines Emergency Planning Group, Mitsubishi, and Blake Emergency Services. Aimed primarily at those within organizations who have strategic responsibilities when it comes to shaping, directing, and developing crisis management capabilities, it is also useful to those who are directly responsible for implementing, maintaining, and testing crisis management procedures within organizations. It is not a specification but takes the form of guidance and recommendations, of which there are 53 in total.

PAS200 differentiates between an incident and a crisis. An incident is defined as "a situation that might be, or could lead to, a business disruption, loss, emergency, or crisis." A crisis, on the other hand, is "an inherently abnormal, unstable and complex situation that represents a threat to the strategic objectives, reputation or existence of an organization." The document is divided into seven clauses. In addition to an introduction and clause on definitions, they are the following:

- Understanding a crisis
- Developing a crisis management capability
- Planning and preparing for a crisis response and recovery
- Communicating in a crisis
- Evaluating a crisis management capability

Each section contains a number of recommendations. Understanding a crisis and its potential origins is essential to its management. Therefore, the first clause sets out what a crisis is, its structure and complexity and the relationship between incidents and crises, the characteristics of crises, and how organizations can become vulnerable to crises and how they incubate within organizations, before describing how higher levels of resilience can be achieved and identifying some possible barriers to success. This clause also describes the difference between a sudden and a smoldering crisis. Among its recommendations is the need to distinguish between business continuity management and crisis management and the need for the development and maintenance of a crisis management capability to be included in an organization's governance and strategic review process.

Developing a crisis management capability is essential to the successful management of a crisis. This clause outlines what is meant by capability before going on to describe how to set the organization's policy and direction, the identification of roles and responsibilities, and the creation of structures and processes, finally stressing the importance of information management and situational awareness in arriving at a common understanding of what is taking place, along with decision making. Among its recommendations is the need for all organizations to create a policy, endorsed by top management, that directs and empowers the appropriate people to lead the development of a crisis management capability. The clause stresses the importance of situational awareness, which is defined as the "process of perceiving, comprehending, interpreting and evaluating what is happening in a crisis, combined with the ability to identify and model foreseeable future developments." It also stresses the need for the use of a common recognized information picture (CRIP), which provides a pan-organizational understanding upon which crisis management decisions that affect the whole organization can be based. Pointing out that rational decision-making models tend to focus on the creation of options and alternatives that are assessed and compared, in pursuit of the best solution, PAS200 points out that, during a crisis, management is often faced with strategic dilemmas that mean decision making is not as clear-cut because it is forced to rely on assumptions that, in some cases, may be misunderstood or not shared by the team or, even worse, may be flawed.

Planning and preparing for the response to and recovery from a crisis outlines the key elements of the plan and logistical factors before going on to describe the activities of the crisis management team and the transition to recovery. This clause also stresses the importance of leadership and highlights the key skills required to manage a crisis effectively, together with some of the key features of decision making.

Communicating in a crisis includes sections on communications strategy, formal and informal communications structures, planning to communicate, methods of communication, and barriers to effective communication. If any organization is to succeed, effective communication is essential; during a crisis, effective communication becomes critical. The clause stresses the need for engaging with all stakeholders, including those within and external to the organization, and identifies core communication needs.

Pointing out that an organization's capability to manage a crisis should be regularly evaluated, the final clause covers training, factors to be taken into consideration when designing exercises, and the different types of exercises, before describing various factors that identify a "crisis-aware" organization, such as active learning, learning by example, culture analysis, and context analysis.

Finally, the document contains a very useful bibliography for those who wish to know more about the management of crises.

Speaking at the launch of PAS200 on behalf of the sponsor, Robert MacFarlane pointed out that "Crises are, by their very nature, unexpected and extremely challenging. Therefore the Cabinet Office today strongly encourages every organization to think about implementing some simple, practical steps to improve their resilience. PAS200 provides an ideal framework to mitigate risks and manage crises and so avoid potentially very damaging consequences that could harm the reputation, if not the very existence, of organizations."

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See Also: Budget Crisis; Business Continuity Management; Cabinet Office, UK; Cascading Crisis; Crisis, Definition of; Crisis Communications; Crisis Management, Emerging Trends in; Crisis Simulations; Debriefing; Debt Crisis; Decision Making Under Stress; Fink's Crisis Life Cycle; Foreign Policy Crises; Mitroff's Five Stages of Crisis Management.

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Quarantine

Quarantine and isolation are well-established public health tools for preventing the spread of infection and have important roles in the practice of crisis management. Quarantine is the separation of asymptomatic, well persons who may have been exposed to a communicable disease from those persons who have not been exposed to the communicable disease. Isolation refers to the separation of ill or symptomatic persons who have contracted a communicable disease, from persons who are healthy. Quarantine and isolation have been used as infection control mechanisms from the 13th century, during the plague epidemic, to 21st-century influenza epidemics. Although quarantine and isolation are internationally recognized public health emergency tools, their acceptance and implementation are controversial because of their inevitable restriction on individual rights and liberties.

Origin

The term *quarantine* comes from the Italian word for 40, *quarante,* which originates from the imposition of a 40-day sequestration of merchant ships arriving in Italy during the plague outbreaks in the 13th century. The first formal quarantine was in 1403, in Venice, during the Black Death, when ships were required to anchor for 40 days before landing to ensure that no one on board was infected.

The theory behind the use of quarantine to control the spread of disease is that hosts (animals or persons that act as pathogen carriers) may be infected with a highly contagious and dangerous disease, yet show no symptoms of the disease during its incubation period—the time between infection and the manifestation of symptoms—when the host is still infectious. Quarantining those individuals who are exposed to infection and remain asymptomatic prevents further unintentional spread of disease. If an individual in quarantine develops symptoms, he/she may then be moved from quarantine to isolation and provided with treatment, if available. During public health emergencies when a population is exposed to a highly contagious and dangerous infection, without a readily available preventive or curative treatment, quarantine and isolation may be viable options to decrease the spread of disease, and therefore decrease fatalities resulting from infection.

Authority to Quarantine in the United States

Quarantine and isolation have been practiced in the United States since the 17th century. Most major cities along the eastern seaboard passed quarantine laws by the end of the 17th century to prevent the spread of infectious diseases such as

Case Study: Quarantine During a Severe Acute Respiratory Syndrome Outbreak in China

Severe acute respiratory syndrome (SARS) emerged in the Guangdong Province of China in November 2002. By July 2003, there were over 8,000 probable cases and 774 deaths in 29 countries. The nature of the disease—its novelty, lack of adequate treatment, severity, and highly communicative transmission—meant that nonmedical public health measures like quarantine and isolation took on important roles in some governmental responses to the emergency. The capital of the People's Republic of China, Beijing, has an approximate population of 13.6 million. The Beijing Municipal Health Bureau, which reports to the China Ministry of Health (MOH), oversees Beijing's municipal health system. All disease reporting, epidemic investigation, and contact tracing are overseen by the Beijing Municipal Health Bureau's Beijing Center for Disease Prevention and Control (BCDC), which comprises 18 District Centers for Disease Prevention and Control (DCDC).

Between March and July of 2003, approximately 2,500 cases were reported in Beijing. Measures to control the epidemic were both community based and governmental and included enhanced surveillance of the spread of infection by public health officials, surveillance of travelers with a fever who arrived from other SARS-affected areas, use of personal protective equipment (PPE) by health care workers, isolation of SARS patients, and quarantine of contacts of known SARS patients.

Approximately 30,000 Beijing residents were quarantined in their homes or at designated quarantine sites by public health officials. During the SARS outbreak in Beijing, the DCDC and community health centers were directed to reach all reported "contacts" of hospitalized patients with SARS and to issue quarantine orders by phone within one hour of notification of a SARS case. In Beijing, a "contact" was defined as an individual who had been exposed to an identified SARS patient for 30 minutes in the following circumstances: (1) health care workers who did not use PPE while evaluating or treating a case, (2) other persons (e.g., family members) who provided care, (3) persons who shared the same living quarters as a SARS patient, (4) persons who visited a SARS patient, (5) persons who worked in the same office or room or workshop as a SARS patient, (6) classmates or teachers of a SARS patient, and (7) persons using the same public conveyance as a SARS patient (rules varied by conveyance).

If these close contacts could not be reached by the DCDC or community health centers, local police were notified to help find the individuals. Close contacts were under quarantine for 14 days from their last contact with the SARS patient in accordance with national guidelines. The 14-day period was reduced to 10 days and then to three days, as more information about SARS' incubation period was uncovered. Approximately 60 percent of close contacts were quarantined at home (the rest being quarantined at government designated sites including hotels, universities, and hospitals) and were unable to leave their site of quarantine except under rare circumstances, during which they had to wear masks. All quarantined persons were followed up daily by a home visit or phone call from the precinct quarantine officer and were provided food and, if needed, medicine, by the municipality. If they acquired fever while under quarantine, they were transferred to a hospital for isolation.

These measures were implemented without any significant objections from the public or legal challenges. The CDC assessed the efficiency of quarantine measures implemented in Beijing and found that quarantine effectively eliminated the risk for transmission of SARS from quarantined persons to others. However, the CDC also found that some were quarantined without actually having met the criteria for it. Additionally, the CDC found that although quarantine might have been effective in preventing healthy, unexposed individuals from contracting SARS, the overbroad nature of the quarantine, such as the quarantine of low-risk contacts, might have had less of an impact in controlling the epidemic. Although the measures Beijing took to control the pandemic were successful, the implementation of multiple overlapping public health control measures limited the CDC's analysis of the effectiveness of quarantine specifically.

plague, smallpox, and yellow fever. When a contagious and dangerous disease presents only in a specific locale, the authority for quarantine usually rests with local public health officials. However, when the disease spreads beyond a single community or has the potential to spread to other jurisdictions in the state, the authority to quarantine is surrendered to the state. Under the Tenth Amendment to the Constitution of the United States, states and localities have the authority to enact laws to protect the health, safety, and welfare of their citizens. The "police power" enables states in certain public health emergencies to quarantine and isolate individuals when necessary to prevent the transmission and spread of communicable and dangerous diseases, even though such action may infringe on citizens' civil liberties.

In the case of *Jacobson v. Massachusetts* (197 U.S. 11 [1905]), the U.S. Supreme Court upheld the authority of states to encroach on individual liberties when the safety of the public may require. The police power is not limitless; states cannot use the police power to defend actions that are unconstitutional and deprive one of procedural and substantive due process. The Constitution's Fourteenth Amendment Due Process Clause provides that no state may deprive any person of life, liberty, or property without due process of law. Procedural due process entitles quarantined individuals to adequate notice of the quarantine, a hearing to contest the quarantine, and a neutral judge; while substantive due process requires that any deprivation of liberty, like quarantine, be in furtherance of a compelling state interest and narrowly tailored to address the state interest.

Although states and municipalities are primarily responsible for implementing public health protective measures, such as quarantine and isolation, the federal government also has authority to implement quarantine under certain circumstances. In 1893, the U.S. Congress passed the National Quarantine Act, codifying standards for the Marine Hospital Service to medically inspect immigrants, ships, and cargoes in order to prevent the introduction of infectious diseases into the United States. Today, the federal government derives its national quarantine authority from the Public Health Service Act (PHS), first codified in 1944. The PHS authorizes the president or the secretary of the Department of Health and Human Services (HHS) to declare a public health emergency and take reasonable action to prevent the introduction and/or spread of contagious, dangerous diseases. Once a public health emergency has been declared, the PHS allows federal officials to quarantine persons reasonably believed to be infected with certain diseases listed by the PHS.

In 2003, President George W. Bush updated this list of diseases subject to quarantine through Executive Order 13295, which now includes cholera, diphtheria, infectious tuberculosis, plague, smallpox, yellow fever, and viral hemorrhagic fevers (Lassa, Marburg, Ebola, Crimean-Congo, South American, and others not yet isolated or named), severe acute respiratory syndrome (SARS), and influenza caused by novel or reemergent influenza viruses that are causing, or have the potential to cause, a pandemic. Once a public health emergency has been declared because of an epidemic, the Centers for Disease Control and Prevention (CDC) is the federal agency authorized to manage federal quarantine actions. Since 2004, the CDC's National Center for Infectious Diseases, Division of Global Migration and Quarantine is responsible for managing federal quarantine matters in the United States. The Division of Global Migration and Quarantine oversees eight national quarantine stations in New York, Atlanta, Miami, Chicago, Seattle, San Francisco, Los Angeles, and Honolulu. The CDC's authority to quarantine during a declared public health emergency is not limitless. Just as the Due Process Clause of the Fourteenth Amendment binds states, the federal government is bound by the Due Process Clause of the Fifth Amendment to ensure that no individual is quarantined without due process of law.

There was little use of quarantine and isolation measures in the United States after the 18th century. However, in 2001, in the wake of the September 11 terrorist attacks, the potential for an attack using biological warfare seemed more plausible, and the CDC requested health officials from the Centers for Law and the Public's Health at Georgetown and Johns Hopkins universities to draft model state health powers legislation. The draft of the proposed Model State Emergency Health Powers Act, released in December 2001, extended states' quarantine powers to bioterrorist attacks involving lethal contagious microbes such as smallpox. Currently, 38 states have adopted legislation modeled after the Model State Emergency Health Powers Act. In 2003, a group of state representatives, national organizations, and government agencies introduced the Turning Point Model State Public Health Act. Like the Model State Emergency Health Powers Act, the Turning Point Act contains provisions outlining states' responsibilities in enforcing quarantine and isolation orders. By 2007, 33 states had adopted features or provisions of this act in their own laws. Both model laws provide due process protections for quarantined individuals, as all states are required to protect civil liberties during public health emergencies. Regardless of whether a municipality, state, or federal government is imposing quarantine or isolation, restrictions of civil liberties should be carried out in accordance with local, state, and federal law and should be as minimally restrictive as reasonably possible.

International Regulations

As one of the member states of the World Health Organization (WHO), the United States is bound by the WHO's International Health Regulations (IHR), adopted by the World Health Assembly in May 2005. These regulations are legally binding on all 193 WHO member states and outline how member states should respond to public health risks posed by the international spread of disease, including when it may be appropriate to quarantine individuals exposed to infection. During a public health emergency, the IHR also authorize the WHO to provide technical support and international assistance and monitor the spread of infectious diseases. The regulations highlight the importance of measures such as quarantine and isolation as public health tools, while warning of the potential infringement on individual rights and liberties. They require any restriction on liberty, such as quarantine orders, to be in accordance with member states' national laws, necessary to contain the spread or mitigate the impact of a disease, to be the least restrictive and least intrusive means available, and to not be arbitrary, unreasonable, or discriminatory.

The regulations provide that governments should also ensure the protection of vulnerable populations, that quarantine and isolation plans should be voluntary to the greatest extent possible (and mandatory as a last resort) be implemented in a manner that prevents others from being infected, that quarantine conditions are safe and humane, that necessities are provided for, that there are measures in place to address the economic consequences of quarantine and isolation on individuals and families, and that legal recourse is available to individuals who wish to challenge their quarantine or isolation orders.

Societal Acceptance of Quarantine

Historically, quarantine has been used as an effective nonmedical public health tool to control the spread of contagious and dangerous diseases. The decision to quarantine involves balancing the public's health and individuals' right to liberty, and its effectiveness depends on when and how it is used, its feasibility, and societal acceptance.

Societal acceptance of quarantine varies by location, and some quarantine measures that are considered acceptable in one country may not be accepted in another. The Harvard School of Public Health and the CDC designed a telephone survey to gauge attitudes toward the use of quarantine in Hong Kong and the province of Taiwan in China, Singapore, and in the United States. Results from the survey indicated that a majority of all respondents supported quarantine measures for persons suspected of having been exposed to a communicable disease. Support was lower in all locations if refusal to comply with a quarantine order could lead to arrest. In general, respondents in the United States were less supportive of restrictive monitoring measures than respondents in the other locations. A large majority of respondents in the United States preferred home quarantine, whereas a smaller number of respondents in the other locations preferred quarantine at home to institutional quarantine. The main worries expressed by all respondents about being quarantined in a health care facility were being exposed to someone with the contagious disease, overcrowding, and difficulty communicating with family members.

The effectiveness of quarantine would be greatly improved if quarantine measures were accepted where they were implemented. Part of acceptance depends on governments' communication about the risks of infection and spread of infection and governments' ability to provide adequate support to their citizens who are under quarantine.

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See Also: Biological Weapons; Cholera; Ebola Virus; Epidemics; Infectious Disease; Influenza; Pandemics; Public Health Surveillance; Severe Acute Respiratory Syndrome (SARS); Smallpox; Tuberculosis; World Health Organization (WHO), UN.

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Reciprocal Agreement

Also known as mutual aid agreements, or MAAs, reciprocal agreements are most broadly defined as arrangements between two or more various groups, including governments, businesses, or organizations. These agreements allow the groups to share space and resources in the event of an emergency, crisis, or disaster. Such agreements are usually reached before the crisis occurs and are often standing contracts to go into effect as needed. These agreements can provide for the use of locations needed to store materials, shelter employees, and conduct business, and can provide other resources as may be needed in times of crisis.

More specifically, the term *reciprocal agreements* generally refers to formalized contractual arrangements made specifically with a focus on technology and computer systems. In these agreements, the groups involved agree to share technological and computer resources, including both hardware and software capabilities. They may also guarantee processing time to other groups party to the agreement during crises and recovery periods. Reciprocal agreements have been used often by businesses like banks. However, as more and more data are stored and processed online, with increasing numbers of backup servers in multiple locations and companies offering electronic vaulting, reciprocal agreements have fallen out of favor for some groups.

In terms of crisis management, reciprocal agreements may be useful in that they help governments, businesses, and organizations prepare for emergencies, crises, and disasters in advance. Efforts like these are critical for thorough and successful preparation. As with many advance preparations, having such agreements in place before the crisis can help groups to respond better, more efficiently, and more quickly to a crisis. Such prior arrangements in the form of reciprocal agreements may also help businesses and organizations recover more effectively, as less time and resources will have been lost to the crisis.

Technology and Computer Systems

Reciprocal agreements are formed in advance of crises and create contractual obligations between the groups involved. They are usually legally binding contracts agreed upon and put into place before a crisis. If successful, this prearranged agreement allows for more efficient crisis management, as it means necessary resources for technology and data backup and recovery exist and are ready for use. By forming reciprocal agreements, different governments, businesses, and organizations can potentially reduce their costs and increase their access to resources in times of crisis. Reciprocal agreements offer many potential benefits to the groups involved. They allow organizations to save technology and digital files in times of crisis by accessing more resources as needed.

To form a successful reciprocal agreement, the groups in question must be compatible. This compatibility applies to a variety of key components, such as equipment, systems, communications, training, and management. Groups must be able to use different groups' equipment and systems with their own equipment, systems, data, and files. Compatible communications, training, and management are important in this agreement to ensure that equipment and systems are kept up to date and, thus, remain compatible with the systems of the other groups. If the equipment and systems are compatible, it is relatively easy not only to put reciprocal agreements into place and to use them but also to test them before a crisis occurs.

Potential Problems

Although reciprocal agreements can provide benefits for all the different governments, businesses, and organizations involved, problems can also emerge. The groups involved in such an agreement need to be relatively the same size and to utilize compatible equipment and other systems, including key components like processing resources and facilities or storage ability. One group seeking out another group with compatible resources can itself be problematic. In many industries, potential reciprocal businesses or organizations that have compatible space, technology, or systems may in fact be competitors. When this occurs, some groups may be reluctant to form reciprocal agreements with others, citing potential complications from letting a competitor have access to information about their resources to monitor compatibility in advance of a crisis or to use said resources in the event of a crisis.

If groups do not have compatible equipment and computer systems, the groups involved do not gain the benefits of additional resources. In situations where a group involved lacks compatible equipment, those involved must come to an agreement about which technology and systems to use, as their equipment and systems must be made to match. This, then, requires at least one, if not more, groups to spend money and time to update these components. Although a reciprocal agreement is a relatively low-cost option if the different governments, businesses, and organizations involved already have compatible equipment and systems, if they are not, the costs increase, potentially significantly.

If groups have compatible technology and systems at the time of the reciprocal agreement but do not keep track of other groups' updates or changes, they may find their systems no longer compatible over time. This failure of monitoring and communication is problematic. Moreover, if not discovered until a crisis has begun, this failure may render the reciprocal agreement useless and leave the groups involved and affected by the crisis with no option for system recovery.

Reciprocal agreements formed with other physically nearby governments, businesses, and organizations may also be problematic in the case of large-scale crises. If all of the groups involved in a particular reciprocal agreement are affected by a crisis, there may be little to no opportunity for them to fulfill the agreement and offer support to one another. Without an avenue for backup or recovery outside the area affected by the crisis, reciprocal agreements are not enough to ensure recovery in the event of an emergency, crisis, or disaster.

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See Also: Critical Applications; Data Recovery; Maximum Acceptable Outage; Reciprocal Site; Recovery Time Objective.

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Reciprocal Site

Reciprocal site refers to a strategic crisis response based on a reciprocal agreement or memorandum of agreement between two organizations, requesting to whom to lend mutual assistance and to back up each other as an emergency happens. This reciprocal assistance would work when local resources cannot meet the response needs of a crisis, such as a large-scale hazard or terrorism event. In order to maintain the continuity of organizational processes, the reciprocal organizations could include both internal and external entities. The reciprocal site is planned during the phase of emergency preparedness, depending on a formal standing agreement for cooperative emergency management; it provides ad hoc resources sharing, allowing mutual supports over multiple jurisdictions. In the crisis realm, a reciprocal site is also defined as "mutual aid agreement," aiming at better future crisis response.

A well-coordinated operation of a reciprocal site, which is a performance evaluation of past investments in preparedness programs, would improve the cost-effectiveness of different response policies. It would also make professional resources available in large-scale hazards. Several scholars have suggested that the reciprocal site should be set as formal agenda to strength crisis preparedness, especially for personal or small-sized organizations. It is common for small towns in the United States with limited or no resources to apply the reciprocal site approach. Many states, such as California, have developed statewide mutual aid systems. Depending on the California Wildland Fire Coordinating Group (CWCG), automatic dispatch from local and surrounding towns would be activated once structure fires or automobile crashes happen.

Case Studies of a Reciprocal Site

Several disasters in history have demonstrated the significance of reciprocal aid (e.g., 9/11 terrorist attacks, Hurricane Katrina). Without strict regulations or accessible alarming systems, organizations would fail in timely response even when a reciprocal site was available. For instance, the Oakland-Berkeley Hills fire storm of 1991, a large urban conflagration in California with 25 deaths, 150 injured, and $1.5 billion economic loss, was finally resolved under mutual aid from southern California and Bay Area fire departments as well as the Incident Command System (ICS). However, at the beginning, Oakland was not able to use many reciprocal site resources because of budget restrictions and the consequential antiquated crisis communication equipment: it could neither access the statewide radio frequencies for fire alarm nor refill the emptied reservoirs during firefighting.

Reciprocal-Site Mechanism

In order to obtain emergency assistance for disasters in a timely manner, the Department of Homeland Security (DHS) has built up the National Incident Management System (NIMS) as a nationwide structured framework for reciprocal sites. NIMS utilizes mutual aid agreements as an integrated part for both governmental and nongovernmental agencies to respond to natural disasters and/or terrorist attacks at the local, state, and federal levels of government. The mutual aid agreements include the Emergency Management Assistance Compact (EMAC), Model Intrastate Mutual Aid Legislation, Model State-County Mutual Aid Deployment Contract, Intrastate Mutual Aid System (IMAS), Water and Wastewater Utility Model Mutual Aid Agreement, and International Association of Fire Chiefs (IAFC) Emergency Management Committee. These reciprocal sites primarily aim to facilitate rapid, short-term deployment of emergency support prior to, during, and after an incident. The NIMS coordinates with the National Response Framework (NRF). The NIMS provides the template for the management of incidents; on the other hand, the NRF provides the structure and mechanisms for national-level policy for incident management.

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See Also: Agency Notification and Mobilization; Alternate Site, Corporate; Bureau for Crisis

Prevention and Recovery, UN (UNDP–BCPR); Business Continuity Management; Business Continuity Planning; Business Continuity Planning Life Cycle; Business Impact Analysis; Business Resumption Planning; Critical Business Functions; Critical Infrastructure; Incident Action Plans; Incident Management; Incident Response; Interoperability; Mobile Recovery Site; Resource Management; Vital Records.

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Recovery

Crisis recovery deals with damages and impacts of an occurred event that has transformed the event into a crisis. In other words, crisis recovery is overcoming the effects and consequences of crisis, whether natural hazard or human-made hazard (that has turned the event into crisis) in more reliable and sustainable ways. This indicates that recovery encompasses rehabilitation, reconstruction, and restoration. Because all post-event activities aim to improve the garbled situation into a more organized situation in order to build capacities and reduce weaknesses, recovery is the main objective in all post-event phases. Consequently, recovery starts after the emergency period that covers the initial days following an event and continues until the completion of reconstruction.

In crisis recovery, the origins of the event could be scrutinized to uncover the main sources of crisis emergence. Such scrutiny is important in crisis response and the limiting of damages. Resolving a crisis is very important in recovery phase, and some teams might be required for this purpose. In the recovery period, the acute stage of crisis has passed, and the affected community or the organization is able to focus on a return-to-normal stage of operations.

In the case of business continuity, recovery encompasses the required steps to restore the affected organization to normal functioning, such as crisis assessment, event tracking, damage assessment and assessing resources and options, human management considerations, development of contingencies, coordination with external bodies, controlling information and expectations, and considering legal issues.

Crises such as the Haiti earthquake in 2010 or Indian Ocean tsunami in 2004 show that the recovery process could be improved by national capacity in confronting potential crises through sound policies. Therefore, recovery affects mitigation and preparedness as well; that is, recovery includes a wide range of activities and comprises damage reduction and risk mitigation. Because of the scope of recovery, recovery plans could be prepared at the national and local levels with mutual feedbacks. Recovery process includes rehabilitation and reconstruction and post-event redevelopment. The recovery could be ascended or descended through different parameters such as available sources, levels of damage, community preparedness, and recovery policies at national and local levels.

Planning for Crisis Recovery

Planning for recovery is done at national and local levels. The national level, which is the most centralized one, includes more general matters like information gathering and assessment, mobilizing resources, administration, budgeting, approving regulations, coordination, and evaluation. National recovery plans usually deal with upper-level issues, and national authorities need to be in close contact with regional and local levels. Recovery plans at local level include information gathering at the micro level, identifying beneficiary groups and stakeholders, plans for settlements, redevelopment of affected areas, and reconstruction programs. Local recovery plans

On October 29, 2011, hundreds of volunteers gather in Joplin, Missouri, to participate in a Habitat for Humanity project to build 10 homes for 10 families before Thanksgiving. On May 22, a record EF-5 tornado decimated the city and caused 158 deaths. Joplin City Manager Mark Rohr, who was an immediate first responder, published lessons learned during recovery in his book Joplin: The Miracle of the Human Spirit. *"You've got to make sure that people in it are mentally in the recovery process," he says.*

may require extensive structural repairs of damaged structures, demolition of hazardous spaces, or relocations in specific areas. Local authorities decide about redevelopment projects in post-crisis situations, since their decisions determine the future life of affected areas and residents as well. Recovery plans comprise different matters like the recovery task force, operational policies, coordination among responsible organizations, damage assessment, restoring utility services, establishing reconstruction priorities, redevelopment of stricken areas, and editing new lessons and experiences from damage assessments. Although recovery plans are prepared by governments, local-level or community participation is very critical and necessary. Therefore, a recovery plan should be based on a community level in which the same vulnerabilities would not be created in the same locations. It is of high importance to prepare recovery plans based on damage assessment and evaluation. Such evaluations should be incorporated in reconstruction and redevelopment plans to avoid creation of the same vulnerability pattern. This indicates that recovery plans should upgrade capacities and infrastructures at the local level to increase resiliency at the national level. Thereupon, top-down and bottom-up approaches in the recovery period need to go along with each other to ensure sustainable results.

The need for rapid actions and decision making in post-event situations makes recovery connected to the pre-event plans. It is expected that recovery plans be prepared in the pre-event phase. Considering the wide range of recovery activities, the recovery process could be divided into short-term and long-term recovery. The short-term recovery

Case Study: Haiti Earthquake Recovery

The Haiti earthquake in 2010 was one of the most devastating events that turned a natural hazard into a crisis. The earthquake occurred on January 12, 2010, and resulted in over 222,000 deaths and over 300,000 people injured. Over 180,000 homes could no longer be occupied, the majority in densely populated informal settlements, generating a large-scale challenge in terms of debris and increased pressure on space. Spontaneous and planned camps were established throughout the affected area, accommodating at peak 1.5 million people. The international response was large scale and well funded. It used a wide range of actors, with varying degrees of experience of humanitarian response, urban crises, and coordination. The shelter sector recovery strategies evolved from meeting emergency needs to addressing a range of shelter solutions including T-shelter and housing repairs. The Shelter, Camp Coordination Camp Management, and Early Recovery Clusters were mobilized to address these needs.

Nongovernmental Organizations

Prior to the earthquake, Haiti was the least developed country in the region, ranking 145th of 169 countries in the United Nations Human Development Index. More than 70 percent of the population lived on less than $2 per day. In the cities, people lived in crowded neighborhoods with poor infrastructure access to basic services. After the earthquake, thousands of nongovernment organizations (NGOs) with varying levels of experience appeared in Haiti. At times this undermined an already weak government sector that had lost infrastructure and personnel. Recovery was further challenged by political uncertainty, annual risks from rain and hurricanes, and an outbreak of cholera at the end of 2010.

Many donors and agencies developed projects to provide transitional shelters (also referred to as T-shelters) to agreed standards. Given the need for large-scale material imports, pressure for land, and other challenges, it took two years to build over 100,000 planned shelters, missing the initial planning target of 18 months—the start of the hurricane season of 2011. Repairs to damaged houses were slow to start but accelerated from the end of 2010 to almost 14,000 houses repaired by agencies by the end of 2011. This figure does not include the houses repaired by people themselves without support. Initial strategies also made provisions for host-family support, but in general projects were not able to scale up to quickly meet these needs on any scale. Two years later, over 6,000 households had received rental subsidies.

Assessments and Strategy

Damage assessments were implemented working closely with the Ministry of Public Works (known by its French acronym MTPTC). The survey was conducted by teams of engineers. Each team had between one and 15 engineers. During the project, there were up to 18 teams at any one time, a total of 270 Haitian engineers. The assessment tagged buildings according to the damage using the following “traffic light” system: green meaning safe for use; yellow meaning damaged, but stable (needing minor repairs to be made usable); and red meaning unstable, either major repairs or demolition and rebuilding required.

A strategy was developed during 2010 to promote support in the areas of origin to accelerate return from camps and reconstruction in rehabilitation. This was not adopted until the beginning of 2011 and formed the basis of the majority of neighborhood-based recovery programs. At the end of 2011, there were still over 500,000 people in camps. This included people directly affected by the earthquake but also reflected a preexisting housing deficit and urban poverty. Official permanent reconstruction assistance shows limited progress, with approximately 5,200 houses built within two years, and limited support for host families. However, the rate of self-recovery and formation of spontaneous new settlements by Haitian families themselves is significantly higher. Support programs including information and training have been limited, and much of the rubble has yet to be cleared.

The delivery of transitional shelter was significantly delayed. However, by mid-2011, each family plot had an 18-square-meter transitional shelter on it. Each shelter included a raised cement-finished plinth and a small veranda area covered by an extended-truss roof. Education and health facilities were formalized with semipermanent or permanent structures of wood and brick construction. The original temporary latrines were also replaced with blocks built of bricks. Eighteen months after the occupation of the site, kitchen gardens and a market selling foodstuffs, household items, and handicrafts had been established. Small businesses, including restaurants, carpentry workshops, and an art gallery, were also established, although the primary source of income comes from work off-site. The school was adopted as a government institution, with the Ministry of Education providing salaries for teachers.

Almost two years after the earthquake, people in camps in Port-au-Prince continued to receive limited free services in water, education, health, and other assistance. However, services were falling back as funds fell and organizations began to close projects. It was recognized that camp-based services could contribute to the sustained presence in camps; however, an acute shortage of return solutions for the majority of the displaced population of former tenants remained the primary factor hindering camp closure. This may have contributed to the sustained presence of camps.

phase involves repair and restoration of damaged infrastructure, housing, and facilities in affected areas. Such matters are mainly set in the rehabilitation period, in which daily life and activities resume and consequently, repair and restoration are the main focus. The actions taken with a view toward longer-term development constitute the activities of the longer-term recovery phase. Reconstruction of houses, roads, structures, and spaces are examples of longer-term development. It should be pointed out that reconstruction does not indicate rebuilding the same structures in the same locations. Reconstruction comprises higher standards with more safety and security that lead to sustainability, and this matter should be the main objective of a recovery plan.

Crisis Recovery: Short Term and Long Term

Crisis recovery comprises different elements in both short-term and long-term recovery phases. In the short-term, or rehabilitation, phase the main recovery elements include damage assessment, restoration/repair, and resuming activities. Damage assessment is an ongoing task that takes different forms at different stages during recovery. The function of damage assessment should be included and addressed as an important element in the recovery period as a matter of clarifying lines of responsibilities in post-crisis. Damage assessment could be done as rapid assessment, or as preliminary assessment, in which a general view of the overall impact of the crisis is shown. Another form is detailed damage assessment, in which the interactions of the impacts are presented. The results of preliminary assessment could be applied in rehabilitation programs, while the detailed assessment results are usually applicable for long-term recovery.

Restoration and repair are other effective elements in short-term recovery. Restoring and repairing infrastructures is very important because of the necessity in today's life of utility services such as power, water, and telephone services. In critical situations, accessing utility services like water pumps, electric power, and telecommunications is a matter of public safety. It is essential that a recovery plan address the need for restoration of all utilities, and the priorities for accomplishing this mission should be outlined.

Usually, daily life and activities are resumed in the recovery period, while in the emergency phase saving lives and provision of basic needs such as shelter and food are the main concern. Resuming daily life and activities is a step toward longer recovery, as the affected community has passed preliminary shocks and impacts of crisis.

Resumption of daily life is related to damage assessment and restoration of utilities. Based on the results of damage assessment, there might be changes in locations of residency and activities. It is not expected that higher standards and safety issues be integrated in short-term recovery since rehabilitation is done in this period. The higher levels of standards are considerations in longer-term recovery that is related to longer development as well.

In long-term recovery, improving levels of standards, considering safety issues, redevelopment, and longer development are main elements. The post-crisis situation can pose a bewildering variety of hazards to public safety and security, many of them lurking in insufficiency of standards. There are different standards in different sections such as the construction section (residential and other buildings), implementation section, or planning section. The recovery plan needs to identify the existing insufficiencies and to develop current standards to higher levels. Such tasks are based on damage assessment results and could be integrated into future mitigation plans. This ensures that the same damages and losses will not occur again. Safety issues need to be considered in long-term recovery and in reconstruction plans. Safety issues are varied and comprise safer construction, revision of current evacuation or emergency access, siting of infrastructures, and even replanning of damaged areas. Such matters could lead to modification of current standards and measures to comprise more security.

Redevelopment projects and longer development tasks could be integrated in post-event projects and in the reconstruction period based on the existence of pre-event plans and an attitude toward integrating development issues in recovery. In communities where redevelopment projects are part of the current planning system, areas for redevelopment are identified in the pre-event period, and this accelerates rebuilding in damaged areas in the recovery period. Such projects are helpful in recovery activities such as retrofitting of unsafe structures and upgrading critical sites. Through redevelopment projects' budgets, damaged structures could receive subsidies to be repaired, hazardous conditions could be diminished, and residents could receive help in relocation or provision of temporary shelter.

Effective Parameters in Crisis Recovery

Recovery could be facilitated or complicated through parameters such as potential capacities, levels of damage, community preparedness, and current policies on risk reduction at national and local levels. The state level of these parameters could facilitate or complicate the recovery process. These parameters are related to the level of development and awareness in affected communities.

Potential capacities like existence of pre-event plans, regulations on confronting crisis, countermeasures against critical situations, and compensation policies should be in accordance with regional characteristics of communities. This matter emphasizes that capacities are meaningful in decentralized situations. Potential capacities could provide a basis to confront crisis and deal with its consequences. Level of damage is determined in the recovery process, since higher levels of damage usually undermine the required sources for recovery. This, in turn, lengthens the short-term recovery and increases the long-term recovery as well. In most cases, level of damage is a function of structural, economic, social, and administrative systems. This indicates that higher levels of damage are the result of neglecting potential crisis in disposed communities.

Community preparedness against critical situations is another important parameter in success of a recovery plan. A community-based recovery plan is an effective instrument in improving local-level capacity to respond to and recover from crisis impacts. Local governments can play important roles in achieving sustainable recovery because of their access and proximity to community residents.

A community-based recovery plan is a proper tool to link the community-based organizations with the government at the local level to establish the relationship that will develop in critical times. Such a plan is essential in identifying the required sources, considering the current situation and the steps that need to be taken to reduce the intensity of deterioration. Also, these plans could comprise different activities for different groups of people that increase public participation and bring the residents and local authorities closer to each other.

Risk reduction policies at the national and local levels can reinforce the recovery process. If measures such as sound construction, density control, open space requirements, codes implementation, and supervision are included in risk reduction policies in national-level and local-level plans, then recovery could start and move more easily in post-crisis. National policies comprise the main lines for risk reduction that define the local roles and contributions as well. It is expected that national policies be in accordance with potential capacities, and local-level participation is included as well. Based on national policies on risk reduction, local governments can transfer human and material sources to communities in order to facilitate recovery at the local level and ensure the implementation of related policies.

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See Also: Coping Capacity; Damage Assessment; Disaster Assessment; Disaster Recovery; Disaster Risk Reduction; Hazard Mitigation; Vulnerability.

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Recovery Time Objective

To paraphrase the Business Continuity Institute (BCI) and the Disaster Recovery Institute, a recovery time objective (RTO) is defined as the duration of time within which critical business systems/processes must be restored and recovered after a major interruption. An RTO is initially established during the business impact analysis (BIA) phase of business continuity management (BCM) program development. Once agreed, these RTOs are then disseminated to crisis management team (CMT) members, as they provide a road map for how to manage the crisis/disaster situation. It is the CMT's responsibility to ensure that appropriate resources are distributed and made available to various involved response, restoration, and recovery teams to enable them to develop strategies to meet the RTO time frames.

Recovery time objectives are used to help build technology restoration and recovery plans to ensure that critical applications and services become unavailable after a major crisis or disaster. However, RTOs also need to be communicated to—and understood by—members of the crisis management team. It is important for CMTs or representatives to understand the impact that recovery time objectives have during a disaster, when services and systems are not available.

Aiding the Crisis Management Team

Recovery time objectives, as milestones, can be used to help monitor and manage the various aspects of the response, restoration, and recovery process. If RTOs are being met, little change is required by the CMT, as it is able to follow established disaster response strategies—both strategic and tactical. However, if RTOs are not being met or there is the potential they may not be met, this can have a significant impact upon an organization and/or community, as implemented contingencies and responses may need to be altered to address the situation.

RTOs not only provide a road map but also aid in the timely dissemination of communications, both internal and external. RTOs provide checkpoints to be monitored so that the CMT understands if—and when—it needs to amend its strategies should objectives be "sliding" or missed. If so, the team must amend its plan, as additional or altered contingency/response strategies may need to be implemented.

An RTO begins when actual restoration and recovery activities begin and does not include the time that a CMT may use to discuss and investigate a situation. If the RTO for a specific service or system is small, say, a couple of hours, it does not provide the CMT with much time to decide on investigative measures; it must implement activities almost immediately if an RTO is to be met. The longer it takes to decide on a strategy, the more the RTO is extended, as its activation activities become delayed.

For instance, if a power outage occurs at a corporation's facility, the corporation may take two hours to decide if it needs to move to another facility (i.e., backup facility) and base its decision on updates received from the local power company. However, if the decision of the CMT is to move operations to the backup facility after the three-hour mark and it takes two hours for staff to mobilize to get to the alternate site, the RTO is still 24 hours for the services and systems but the availability of those systems has now moved to almost 30 hours. This is why crisis management teams must be aware of the RTOs attributed to core systems and services.

By monitoring the RTOs closely, the CMT can also identify whether there are other repercussions of their not being met. Financial penalties may be implemented if a system or service is not available at specific times (usually identified in a service level agreements [SLA]). If the CMT understands the status of the RTO, it can take measures to extend or eliminate any potential fine implementation.

Not monitoring the RTOs by the crisis management team can mean it does not know the status or what to expect as things move forward. It could make an existing crisis more confusing or escalate an existing crisis because the right modification to contingency strategies (that have been implemented) have not been organized and implemented in due course—or when expected—because of the expectation that a service or system would be available during a specific time.

This would also be leveraged through the media, as the crisis management team would need to have someone specifically designated to communicate this to the media (and the public at large), or else it can cause rumor and speculation, all because communications on the status of RTOs is not being monitored.

If the public is expecting information at the 24-hour mark but it now looks like it will be 48 hours because of unforeseen issues, a proactive and preemptive strike needs to be made. It also helps establish what is required of employees who might be expecting to travel to a new location at a specific time but must receive information that they cannot do this because the RTO is not being met. Monitoring the RTO helps establish a realignment of activities to ensure the situation is being managed effectively. The CMT may need to direct divisions and departments to implement appropriate contingency measures that align with the status of the RTOs.

RTOs in a disaster also provide a level of comfort for those impacted, as they let them know when they can expect to return to some level of normality when services and systems become available.

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See Also: Business Impact Analysis; Recovery; Response Team.

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Red Cross and Red Crescent

The International Federation of Red Cross and Red Crescent Societies (IFRC) is one of the largest crisis management organizations in the world. This brief introduction discusses the founding and contemporary characteristics of the organization, its governing philosophy, and its crisis management practices.

History and Contemporary Organization

The International Federation of the Red Cross and Red Crescent Societies was founded in Geneva in 1862. Swiss businessman Henry Dunant was struck by the suffering of wounded and dying soldiers and by their lack of medical care after Italy's Battle of Solferino. He returned to Geneva to create a committee of influential elites who shared his concern. By August 1864, 12 states had ratified a convention of 10 binding rules, which together guaranteed neutrality and protection for wounded enemy soldiers and those caring for them during an armed conflict. Currently, the organization is guided by seven fundamental principles: humanity, impartiality, neutrality, independence, voluntary service, unity, and universality.

With a Red Cross or Red Crescent society in almost every country in the world (187 in total), the IFRC is the world's largest organization providing humanitarian assistance, especially during and after disasters. In a large-scale crisis such as the Haiti earthquake in January 2010, the IFRC organized more than 120 national societies to contribute funds, human resources, or goods to the local Red Cross/Red Crescent response.

There are more than 13 million volunteers globally, who work at the local level in the areas of disaster response and recovery, disaster preparedness and risk reduction, health, and development. This localized network enables the IFRC to provide an immediate response, often arriving first on the scene. In 2010, volunteers provided an estimated $6 billion worth of services, helping more than 30 million people in disaster situations alone.

Governing Philosophy

The IFRC has historically been known for its immediate relief efforts after a crisis or hazard. Today the Red Cross/Red Crescent maintains four core components to their crisis work. The organizational focus continues to be saving lives, the reduction of suffering and losses, and the protection and comfort of those affected.

The IFRC has added to its repertoire of supporting activities mitigation, preparedness, and creating resilient communities. A recent example is the IFRC's work in Haiti after the 2010 earthquake. Beyond providing relief, the local Red Cross worked with community members to rebuild homes and buildings in more sustainable and earthquake-resistant fashion; it also worked to build local capacity and resiliency, which would have latent benefits such as empowerment and economic development within the community. By taking a holistic approach to relief and recovery, the local Red Cross was able to address multiple community needs while also strengthening civil society.

Another recent approach enacted by the IFRC is community-level disaster mitigation. Starting with a local analysis of vulnerabilities and capacities, the local Red Cross finds strengths and weaknesses to crisis resiliency. The organization then partners with community leaders and local government officials to prepare the community for future possible disasters.

Crisis Management Practices

The IFRC's integrated approach to disaster management focuses on meeting the needs of individuals and communities in ways complementary to the resources and efforts of other organizations, international agencies, local authorities, and civil society broadly defined. With the support of national societies and a global response system, the IFRC can quickly and efficiently obtain resources and expertise to support local response. Over its history, the Red Cross has acquired specific knowledge and know-how to deal with crises, including three systems that can be employed within hours: Field Assessment and Coordination Teams (FACT), Regional Disaster Response Teams (RDRTs), and Emergency Response Units (ERUs), as well as relief and logistics hubs and extensive networks of prepositioned relief goods. Together, this global response system provides arguably the most efficient and capable arrangement of global, regional, national, and local capabilities.

Additionally, the IFRC views crisis management as a cyclical process. In a post-crisis setting, the organization is heavily involved in relief efforts. Concomitant during the relief period are strategies to begin to restore livelihoods and enhance food security, addressing issues of public health, shelter provision, and psychosocial support. These practices are continued throughout the midterm recovery process. The IFRC furthers these goals by designing its practices in such a way that it decreases survivor dependency and encourages greater capacity and resilience in case of a future crisis.

In sum, the IFRC continues to be one of the most active global contributors to crisis management. Its work has had a significant impact on the lives of people in the most vulnerable populations after several major disasters.

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See Also: Disaster Recovery; Nongovernmental Organizations; Preparedness; Response.

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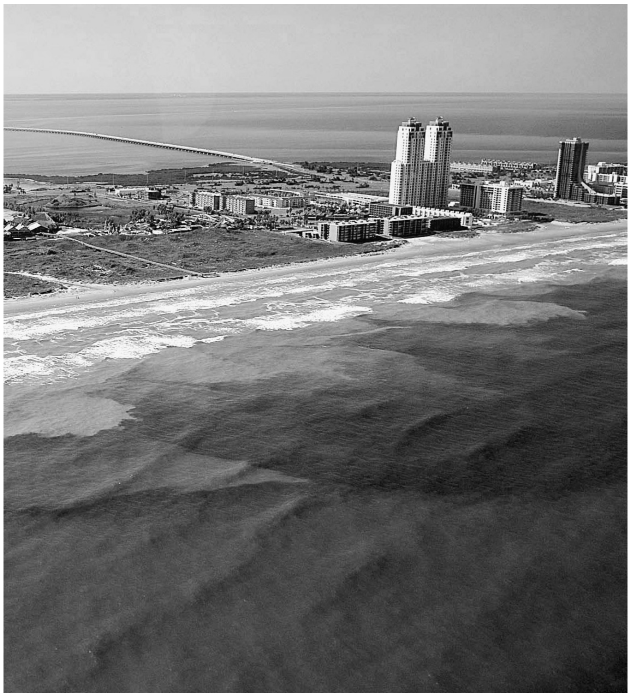
Red Tide

Phytoplankton, primarily diatoms and dinoflagellates, are floating single-celled algae that are present throughout the marine and freshwater ecosystems and are a significant foundational component of food chains and webs. When conditions are right and these microscopic algae reproduce in great numbers, it can give rise to a phenomenon known as red tide. The common name, red tide, refers to the color of the water, with the hue determined by the species of microalgae. This reproductive activity is called a bloom. Algal blooms can be red, brown, blue, blue-green, or yellow. Blooms are not limited to the coastal waters of the United States and have been documented worldwide. If an algal bloom occurs involving one of the few toxic species of dinoflagellate, then the event is classified as a harmful algal bloom (HAB). The microscopic marine algae most often associated with red tides is *Karenia brevis*. *K. brevis* produces toxins called brevetoxins, which are responsible for mass death of fish, birds, and other marine organisms and can cause severe neurologic and gastrointestinal symptoms in humans exposed to it. Red tides, as a natural phenomenon, have been documented since early times. The Gulf of Mexico states Texas and Florida have committed resources to research and monitor red tide because of the negative impact a bloom can have to these states' economies. Understanding red tide as health, environmental, and economic concerns became a national focus by the 1990s and a global concern in the early 2000s.

Possibly one of the earliest descriptions of red tide can be found in Exodus as one of the first of 10 plagues of Egypt: "all the waters in the river were turned to blood. The fish that were in the river died, the river stank ..." Another early published record of red water in the ocean is that of Charles Darwin, who, in 1832, while aboard the H.M.S. *Beagle*, sailing off the coast of Chile, examined water from muddy bands through which the *Beagle* had passed. He observed the water to have a pale reddish tint and to contain swarming minute "aminalculae." In 1858, a researcher ascribed the cause of various colors of seawater near Bombay to a dinoflagellate, and by 1868 scientists understood the cause of discoloration in the ocean waters to be microscopic algae. Nunez Ortega produced a historical record in 1879 that provide the earliest verifiable record of red tide in the Gulf of Mexico. In the mid-1940s, a red tide event began, causing a large fish-kill along the western coast of Florida. This HAB was estimated to have killed millions of fish that washed ashore on beaches, with the dead amounting to 100 pounds per linear foot of shoreline. Studies indicated the dinoflagellate involved to be a *Gymnodinium sp.*, now called *Karenia*. Ample evidence indicates that algal blooms of all kinds have been widespread throughout time and at multiyear intervals.

In the last 50 years, considerable research has focused on HAB events off the coasts of Texas



Red tide cell (Karenia brevis) *concentrations off the coast of South Padre Island, Texas. Along with Florida, Texas has committed resources to research and monitor red tide, which can cause environmental and economic damage.*

and Florida. *K. brevis* blooms produce strong chemical toxins that are harmful to marine animals and humans, causing public health concerns. Brevetoxins can become concentrated in the shellfish tissues, which, when consumed by people, can cause neurotoxic shellfish poisoning, a kind of food poisoning with severe gastrointestinal symptoms and neurologic reactions. Breathing in air near red tides or swimming in red tide waters affects human by causing shortness of breath; irritation of the nose, eyes, and throat; and coughing. People with existing respiratory impairment may experience symptoms to a greater degree. In coastal Texas and Florida, recreational and commercial fisheries and tourism are major industries that can be negatively impacted by a red tide bloom. For these areas and others where red tide can be an environmental and health emergency—as well as an economic disaster—it becomes important to understand the causes of blooms; to evaluate the blooms from environmental, health, and economic perspectives; and to plan and prepare for the impact of red tide. Both Florida and Texas lead the Gulf of Mexico states in funding research for, educating the public about, and monitoring HABs. The economic damage caused by HABs to coastal areas that rely on tourism, recreation, and seafood harvesting was estimated at $1 billion in losses over the last several decades.

National Organizations

On a national level, both the Centers for Disease Control and Prevention (CDC) and the National Oceanographic and Atmospheric Administration (NOAA) are involved in research and education about red tide and other HABs. The CDC has established the National Center for Environmental Health (NCEH), which is responsible for planning, directing, and coordinating the national program devoted to improving the health of Americans by promoting a healthy environment. NCEH has identified red tide as one of the environmental hazards under its area of interest. It maintains a list of HAB publications on its Web site based on current research and policy. By 1998, NOAA had established a National Harmful Bloom program to conduct research on the means to prevent, control, and mitigate blooms and their effects. The national program is a sponsor of an international program called GEOHAB.

Although no definitive answer has been found to explain or predict why or exactly where a red tide may occur, research indicates some factors that are common to this type of HAB: (1) they occur in association with surfacing of nutrients that encourage and promote rapid reproduction of the dinoflagellates, and (2) blooms may be initiated from cysts resting on the sea floor that may be seed populations waiting for the right environmental conditions to reproduce.

NOAA's National Center for Coastal Ocean Science (NCCOS) provides support to communities in their efforts to fight HABs. This support includes NOAA's Analytical Response Team (ART), which is composed of a multidisciplinary team of scientists and an event coordinator responsible for designing and implementing an event-specific solution to identifying toxins associated with HABs. The team responds to events associated with harmful algal blooms such as unusual mortality events and human illness and provides rapid-result test kits. The ART is contacted by the Marine Biotoxins program scientific staff, who are part of a network of coastal stewards who study harmful algae and other coastal species. Other support includes promoting volunteer monitoring of HABs, research on harmful algae, and development of new sensor technology.

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See Also: Centers for Disease Control and Prevention (CDC); Environmental Contamination; National Oceanic and Atmospheric Administration (NOAA); Sustainability.

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Refugees and Forced Migration

What primarily distinguishes refugees and forced migrants from any other migrants is the fact that they flee a specific situation of crisis. These catalysts can be political in nature, such as the Bosnian war in the 1990s, or environmental, such as the drought in east Africa that began roughly in mid-2011. Forced migration is therefore generally engendered by what are called "push factors," such as armed conflict, generalized violence, environmental disasters, or any other life-threatening situations, including acute social or economic crises. Because of the extremely critical situations at the root of their flight, these populations migrate in conditions that are often particularly precarious. Their vulnerability is further heightened by the fact that the authorities of their country of origin are no longer willing or able to protect them.

To respond to their plight, the international community has created legal and institutional instruments to provide them with protection and/or assistance. The United Nations High Commissioner for Refugees (UNHCR), created after World War II, is the main international institution dealing with forced displacement and the right of asylum. UNHCR statistics of "people of concern" to the agency give a picture of these populations today. According to the agency, there were around 33.9 million people of concern to UNHCR by the end of 2010, including 10.55 million refugees, 14.7 million internally displaced persons (IDPs) protected/assisted by UNHCR, and 3.5 million stateless persons.

These various categories of forced migrants have emerged from international institutions' practices in their attempts to respond and better manage forced migration. A refugee is a person who fled his/her country because of persecution "for reasons of race, religion, nationality, membership of a particular social group or political opinion," according to the 1951 Convention relating to the Status of Refugees. The most important right contained in this document is the right of nonrefoulement (Article 33), which prevents a state from returning the refugee to a place where he/she would face life-threatening dangers. In addition to the UN convention, African (1969) and South American (1984) legal instruments for refugee protection were developed with the objective of adapting to the new political realities in those regions. Both expanded upon the traditional refugee definition to include generalized violence and massive violations of human rights.

Although refugees have a specific legal definition and set of rights as outlined in the 1951 Refugee Convention, others who are forcibly displaced because of life-threatening crises remain in a much more uncertain legal state. In particular, IDPs, asylum seekers (refugees who have not been recognized as such), and stateless persons may face situations of legal limbo that render them particularly vulnerable and out of reach for international assistance organizations. For example, because IDPs remained in their home state, it is sometimes difficult to reach them in order to offer assistance. In addition, IDPs tend increasingly to settle in urban areas that present new operational challenges for aid agencies, which are required to work without a clearly defined humanitarian space. In 2009, it was estimated that there were about 27 million IDPs. Although IDPs do not enjoy a binding legal document that governs the response to their plight, the 1998 Guiding Principles on Internal Displacement set out the standards for institutional responses to internal forced movements. To those various forced migration categories, development-induced forced displacement and human trafficking should also be added. These situations present other forms of vulnerabilities and challenges in terms of protection and assistance but will not be developed further here. The UNHCR works with a number of implementing and operational partners, which can be governmental and nongovernmental organizations, such as the European Union or the International Committee of the Red Cross (ICRC).

The international community's attempts to respond to the plight of forced migrants are not only driven by humanitarian concerns. Indeed, states might have an interest in ensuring good management of forced displacement because of the instability such a phenomenon may generate. States often argue that displaced persons are not only the consequence of crises but may also, in some instances, generate further situations of political disorder and violence. Forced migrants may be viewed to constitute a threat to national security and stability both at the political (such as by importing the conflict into their place of asylum) and at the economic level (by straining resources, for example). In that sense, states' interests also shape the refugee and forced migration regime (i.e., the legal and institutional instruments mentioned above) and the way a displacement crisis will be managed. The Indochinese (1988–96) and Central America (1987–95) Comprehensive Plans of Action created to address long-standing refugee situations in their regions are two major examples of cooperation between states and international organizations where both humanitarian concerns and states' interests came into play to address widespread forced migration crises.

Nonetheless, it appears today increasingly difficult to manage and eventually solve forced migration crises. For various reasons, the three possible durable solutions to forced displacement that the UNHCR has identified (return to the home country, local integration in the host country, and resettlement to a third country) are not accessible to many forced migrants, who increasingly find themselves in protracted situations. They are forced to spend more and more time in temporary settlements that range from closed or open camps with full assistance to unplanned settlements out of the reach of international aid. As such, what was at first a short-term solution to respond to their flight tends nowadays to last longer and longer, to the point that these precarious and provisional situations become the status quo. Such refugees and forced migrants are paradoxically stuck in a static state in which their rights are severely restricted (from the right of movement to the right to education and work). In 2011, around 7 million refugees were in a protracted refugee situation, the average length of displacement being almost 20 years. To those should be added the 5 million Palestinian refugees (2012 figures from the UN Agency for Palestine Refugees, UNRWA), among whom some have been displaced for more than four generations.

Conclusion

Managing refugee and forced migration crises needs to take place at two levels: by addressing the causes of forced displacement (such as dictatorial government or civil war) and by offering solutions to the displacees in order to avoid further violence, instability, and long-term crises. While the first aspect falls outside the scope of this article, the increasingly protracted nature of forced displacements makes it clear that the international community is falling short of solutions to forced migration situations. Indeed, while international instruments are evolving to better manage and solve forced migration dilemmas, the international system, strictly divided into sovereign states, is practicing increasingly restrictive migration and asylum policies that reduce the potential for solutions to forced displacements.

Furthermore, the forced migration regime is facing new challenges, particularly because of the growing trend of multi-causal displacements. These mixed flows make it increasingly difficult to discriminate between forced and voluntary migrants and bring to the limit the legitimacy of such legal and conceptual differentiation among migrants. Finally, what this current situation highlights is an underlying "sedentary logic" of the global regime today, which struggles with human mobility, one of the main survival strategies since the beginning of human history.

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See Also: Civil War; Climate Change Adaptation; Failed States; Famine; Human Trafficking; Immigration; Office for the Coordination of Humanitarian Affairs (OCHA), UN; Red Cross and Red Crescent.

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Reinsurance

Disasters and crises—large-scale, natural, and human-made events including, but not limited to, accidental, biological, climatological, financial, geophysical, hydrological, meteorological, technological, and terrorism-related events—often leave in their wake immense losses that are generally too high for an individual household or firm to solely assume. In contrast, the fundamental objective of insurance is to spread high individual risk of loss across a larger pooled group that is better situated to absorb this overall loss risk. Thus, one main way for society to provide for and protect against inevitable large-scale disaster and crises-related losses is through the procurement of insurance prior to the event. The relative infrequency of these large-scale events coupled with abundant sources of loss uncertainty and potentially multiple-event occurrences in a single year creates difficulties for primary insurance providers, who must identify and quantify risks, occurrence intervals, and plausible consequences before extending coverage. The reinsurance sector plays a critical role in resolving this difficulty in two ways: risk management and risk assessment. Simply stated, reinsurance is insurance for insurers.

Accordingly, reinsurance has two primary functions related to crisis. First, reinsurers reduce loss exposure and provide loss diversification for primary insurance companies through risk transference (risk management). The global nature of private reinsurance companies, and hence large pooling capacity, is one business characteristic allowing them to underwrite this disaster and crisis risk in a relatively cost-effective manner, resulting in a number of benefits (for insurers and society) related to offsetting this risk to reinsurers. Second, the reinsurance sector has become a primary driver in the tool, technology, and methodology innovations for disaster and crisis identification and quantification (risk assessment). Reinsurance has existed since the late 14th century and cuts across many different lines of insurance, but in a new era of catastrophes highlighted by extreme losses, its role in assessing and managing risk has become more vital than ever before.

Overview of the Reinsurance Sector

The reinsurance sector covers many diverse risks all over the world. Similar to the insurance industry, coverage can be grouped across two main lines of business: life and nonlife. Life reinsurance provides loss coverage for accidents, health, death, disability, and injuries. In addition to covering property losses resulting from natural disasters and other more high-frequency hazards such as fire, nonlife reinsurance provides loss coverage for marine (cargo and shipping), casualty (product and employer liability), engineering (construction and technology), aviation, and terrorism events. Total premiums underwritten by the reinsurance industry are approximately $200 billion, with nonlife premiums representing 75 percent of this total. Reinsurance is provided primarily by specialized reinsurers in the private market. However, the provision of reinsurance is not limited to specialized reinsurers or to the private market. Investors as well as primary insurers can also issue reinsurance. Moreover, government entities can also issue reinsurance, given proper statutory approval. For example, a significant portion of wind insurance related to hurricanes in Florida is further reinsured by a state-run reinsurance entity, the Hurricane Catastrophe Fund.

The debate as to whether reinsurance should be provided by private companies versus a government-run entity is ongoing. On one hand, it is argued that the costs of reinsurance (and hence, potentially the cost of hazard insurance to policyholders) may be lower if offered by a government-run entity because of lower tax and profit-margin considerations. On the other hand, the pooling of risks by a government-run entity would likely be much less significant compared to a global reinsurer, as risks that are locally dependent (hurricane hitting Florida) may be globally independent (hurricane hitting Florida and flooding in Thailand). Nonetheless, the largest reinsurers tend to be private reinsurance firms operating on a global basis—Munich Re, Swiss Re, and Hanover Re, for example. Further, there are a number of reinsurance brokerage firms that act as intermediaries between reinsurers and insurers in policy underwriting. Reinsurance brokers have also taken on much of the role of advanced risk assessment and create platforms that assist in the trading of risks that seem otherwise difficult to trade and hedge. Finally, regulation of the reinsurance sector is primarily centered on solvency. This contrasts with insurance industry regulation, where prices are subject to considerable regulatory oversight in addition to solvency issues.

Reinsurance as Risk Management

Privately held insurance coverage provides individuals and businesses a basic safeguard against a risk that would overwhelm individual capacity. Likewise, insurers pass on aggregated portfolios of risks to reinsurers, who in turn indemnify the insurer against a certain level of loss.

The amount of coverage to policyholders an insurer is willing to provide against risks in different hazard-prone areas partly depends on how much of its exposure it can transfer to reinsurers and at what cost. Insurers purchase reinsurance for losses associated with disasters and crises to limit liability and thus have the ability to offer higher coverage levels, smooth often-drastic fluctuations in losses that are inherent to these events, and provide protection against extreme losses associated with disaster and crises. Comprehensively, this risk management process covers more assets and effectively reduces the volatility and severity of claims by guarding against extreme events through a higher level of risk transference and diversification of losses. As such, the stability of not only the insurance industry sector but also the overall economy is partially achieved. This stability then potentially leads to taking on more risk and hence spurring economic growth. Additionally, through the true pricing of risk from reinsurer to insurer to policyholder, economic incentives may be put into place to encourage mitigation actions on behalf of the insured to limit their risk exposure and cost of insurance.

Reinsurance as Risk Assessment

The risk transference between policyholders, insurers, and reinsurers is not costless, and thus it is critical to properly price reinsurance risk and risk transference. In addition to implementing proprietary models, many reinsurers have turned to reinsurance brokers or enterprises specializing in modeling catastrophic risk to assist them in determining how much coverage to offer and what premiums to charge for such coverage. Catastrophe models utilize a probabilistic approach to disaster and crisis loss quantification that is currently the most appropriate way to handle the relatively limited historical loss data and abundant amounts of uncertainty inherent in all hazard/disaster phenomena. Even though the proper pricing of the risk is a significant component of catastrophe model development, the risk assessment at both individual and aggregate levels is an additional and substantial outcome of this process that has become embedded in the insurance and reinsurance sectors.

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See Also: Disaster, Definition of;Disaster Risk Reduction; Losses, Quantitative Versus Qualitative; Insurance; Risk Analysis; Risk Society.

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Religious Violence

Religious violence has been a part of human history for thousands of years, but in recent decades there have been more outbreaks in more locations around the world. Crisis managers have had to help governments, nongovernmental organizations (NGOs), religious institutions, and other entities prepare for, adjust to, and recover from episodes of short-term or extended periods of religious violence. There can be a fine line between the definition of religious violence and terrorism. Some of the actions taken by governments have been aimed at terrorism. Because of the close connection between terrorism and some religious violence, efforts by crisis managers to deal with terrorism are relevant. In recent years, much attention has been focused on violence related to radical elements of Islam. However, religious violence is found in many other contexts.

Since religious violence would necessarily involve criminal activity, a governmental response would be expected. This would sometimes take the form of a police or military intervention. Government crisis managers would naturally be concerned with preventing or stopping harm to persons and property, or with finding and holding responsible those involved in criminal conduct.

Governments have typically called out armed forces to quell violence. Curfews are established to reduce the potential for opposing groups to encounter each other. When parties are out of each other’s paths for a few days, there can sometimes be a move toward normalcy. Often, religious leaders issue public statements; some of these can be inflammatory, while others can tend to soothe tensions.

Efforts to Curb Religious Violence

In light of radical religionists who have been at the forefront of perceived or actual religious violence in recent years, a number of nations have undertaken rather aggressive steps to prevent the outbreak of this activity. This has been especially true in many European nations that have large numbers of immigrants. These nations have undertaken a variety of measures to maintain order when there is the possibility of religiously motivated violence and disorder.

Antiterrorism laws have been passed by a number of countries to enhance internal security, as well as the security of travelers abroad. These laws do not mention the religious aspects of internal violence, but they do enable the nation’s security forces to take steps to identify those who might undertake terrorist acts and prevent their success. Such laws deal with watch lists, money flow, and international suspects’ location, as well as procedural matters related to those charged.

A number of nations have also implemented procedures that deal directly with religiously involved potential perpetrators. These actions seek the repression of religious violence by aggressive steps. Several European nations have taken to closely monitoring mosques suspected of harboring radicals. This monitoring has taken a wide variety of forms, and these activities have led to the deportations of many individuals, including imams, from these countries. Hate crime laws have been passed that give protection to Muslims who have been targets of religious violence. Some have enacted laws that make it a crime to encourage religious hatred.

Along with strict laws to repress religious violence, a number of countries have fostered institutions and laws that would encourage and, in some cases, compel the integration into society of those who might be seen as a danger. Religious dialogue is often used as a way to integrate into society those people who are not integrated and might pose the threat of religious violence. Giving a voice to members of a minority religious group through the formation of representative groups may also foster better integration into the society. In addition, governments have provided funds to spur integration. In one country, the government funded a community center that was actually attached to a mosque. Some nations have required that immigrants learn the national language as a condition of being able to serve as members of the clergy. France took the step of prohibiting students from wearing religious symbols in public schools. This measure was primarily aimed at preventing Muslim females from wearing burqas in these settings, because the burqa was seen as a possible dividing symbol that could lead to unrest.

Religious Organizations

Religious institutions should have access to crisis managers to reduce the likelihood of these bodies becoming targets of violence and to work to prevent adherents from becoming involved in violence toward other groups. One person should be designated to provide leadership in security issues for the organization. An assessment should be made of potential risks. This assessment should be done in conjunction with responsible law enforcement agencies or a qualified person or group. Religious groups are encouraged to develop a security plan that will provide the needed information should an emergency develop. Policies should be implemented to restrict involvement in activities that might lead to escalating violence.

Communication is key to reducing levels of religious violence. The exploding use of social media by ever-expanding percentages of the world's population can be both a bane and a blessing. Social media can be used to arouse hostilities by spreading facts or falsehoods. Flash mobs can quickly be formed that will instigate incidents of religious violence. However, social media can also be used by those seeking to calm tensions. Crisis managers would do well to master the use of these media in the face of potential religious violence.

Lack of crisis management can lead to out-of-control situations. Certain regions have faced escalating religious violence that has led to a total breakdown of society. Throughout history, breakouts of religious violence have led to dramatic episodes resulting in loss of lives. Governments and religious institutions bear dual responsibilities for instituting policies and procedures that will mitigate against religious violence.

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See Also: Civil War; Ethnic Cleansing; Failed States; Revolution; Riots; Terrorism.

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Reputational Risk

Reputational risk, also referred to as reputation risk, is the risk arising from a negative stakeholder perception of an organization's business practices and trustworthiness that can adversely affect its ability to maintain existing or create new business relationships and have continued access to resources.

The reputation of an organization is shaped by a host of drivers, among which are the quality and pricing of its products and services, its long-term financial performance, corporate governance and regulatory compliance, human capital and talent management culture, corporate social responsibility, and its communication disclosures both in times of normalcy and in crisis. As with any other type of risks, reputational risk has a factual premise (a triggering event), manifests itself through a series of other factual circumstances (negative publicity), and ends in a consequence (organization's value loss). The triggering event may stem from any of the organization's reputation drivers. The resulting loss in the value of the organization extends beyond event-related accounting losses and is usually reflected in a decline in its share performance metrics. In a world dominated by media, studies show that there is an 80 percent chance for an organization to lose more than 20 percent of its value at least once over a five-year period as a result of reputational risk mismanagement and negative stakeholder perception. But share performance is for many a crude measurement of reputation. There are more sophisticated methods and indexes that purport to measure and compare organizational reputations. One example is the index offered by Steel City Re, a consultancy that targets "headline risk" (the risk stemming from bad publicity) and is based on four "forward-looking" indicators: shareholder behavior, communications effectiveness, operating costs, and the organization's ability to command premium pricing based on its brands.

Triggering Event as a Risk

What perhaps distinguishes reputational risk from other types of risk is that the triggering event is normally also another risk, with its own factual circumstances and consequences for the organization. For example, the situation faced by BP as the oil spill in the Gulf of Mexico ran on for weeks, with increasing amounts of pollution washing ashore, was a collapse of its reputation because of excessive operational risks taken, resulting in a series of failures in the original oil rig accident and the subsequent cleanup effort. The recent corporate reputation history has shown a multitude of triggering events with their own circumstances and consequences: product failure that led Toyota to recall several million cars; poor business performance, with Olympus attempting to cover up huge and long-running investment losses; a social responsibility gap for Nike being accused of using sweatshops for the production of its sports lines; corporate misbehavior, with Siemens and BAE systems using political corruption internationally to help its sales; spokesperson misbehavior and controversy, with Gillette and TAG Heuer (among many others) suspending their advertising contracts with Tiger Woods following his infidelity scandal; and controversial ownership, with Libya's former dictator Muammar Gaddafi being revealed to have stakes through his investment company Lafico in Fiat SpA, the Italian soccer club Juventus, and *Financial Times* publisher Pearson.

Reputational risk has, therefore, a "compounded" nature, which justifies its classification by many risk managers as a "risk of risks." As such, rather than treating it as a separate and distinct category of uncertainties, organizations should embed reputational risk oversight into their existing risk management process. In the stage of risk identification and assessment, risk owners should also evaluate, apart from the physical and financial impact, the reputational impact of the risks assigned to their area of responsibility. Then, the response strategy (risk treatment) they develop for each risk category in their portfolio should also take into consideration effects on reputation.

The challenge for risk owners is that reputational impact will vary among the different stakeholder groups. It is therefore useful to look at reputation as a two-part construct. The first part, the "reputation capital," is the perception of the organization by those stakeholders whose relationship is directly instrumental to the pursuit of long-term growth and shareholder value. This economic connotation of growth and shareholder value enhancer makes reputation capital quantifiable in monetary terms (e.g., dollar value). The second part, the "residual reputation," refers to those stakeholder groups that do not affect shareholder value. This distinction will allow risk owners to identify stakeholders and prioritize them from a reputational impact perspective based on their actual influence; the criticality, rationality, and urgency of their claims; their access to and control of key business resources; and the likelihood of their taking supporting action.

Reputational Risk Treatment

When it comes to reputational risk treatment, the risk owners can choose one or more strategies offered by the AMAT (avoidance, mitigation, acceptance, and transfer) model.

Reputational risk avoidance is clearly the preferred strategy for most organizations concerned about the reputation consequences of risks arising from their actions. Involvement in activities or with persons that may result in negative stakeholder perceptions are avoided by some companies, such as, for example, the German telecommunications company T-Mobile, which in 2007 withdrew its sponsorship of a cycling team, 16 years after it first signed on to the sport. The T-Mobile team was hit hard by a series of doping scandals, which resulted in the company terminating its contract in order to avoid exposure and association with doping practices in sports.

Reputational risk mitigation is the strategy option for organizations to reduce the level of risk exposure to a comfort zone for them while continuing the activity that is giving rise to the risk. Taking a proactive approach in an effort to reduce the likelihood of bribery risk occurring, many British organizations developed or updated their "Standards of Business Conduct" to ensure that their policies and procedures remain at the forefront of best practice and to ensure alignment with the provisions of the UK Bribery Act 2010. On the other hand, the UK-based Macmillan Publishers took a reactive approach, attempting to reduce the reputational and financial damage in relation to past unethical conduct by its education business in Africa, when it self-reported the case to the Serious Fraud Office in March 2010 and cooperated with the probe, appointing external lawyers to investigate publicly tendered contracts to supply educational material in Rwanda, Uganda, and Zambia between 2002 and 2009.

Reputational risk acceptance is a strategy for organizations that make an informed decision to accept the reputational risk associated with their actions and assume full responsibility for any subsequent consequences. This acceptance results from a belief that the rewards to be gained will outweigh any negative effects on their reputation. A classic example of such a strategy is the series of provocative advertisements launched by the Italian fashion group Benetton, which, in a few years, gave the brand global awareness and recognition. Benetton retained a significant amount of reputation risk, which would arise from a backlash of its aggressive and controversial promotional messages based on the calculated assumption that the rewards from its campaigns would be far greater.

Reputational risk transfer can be achieved with an insurance policy. Increasingly, insurance companies offer organizations coverage for specific reputation-damaging events such as product recalls, directors' and officers' liability, and policies known as the "3D indemnity" covering the death, disgrace, or disability of an organization's spokesperson. An example of a broker for such a strategy is DeWitt Stern, which offers policies that would cover U.S. organizations for up to $50 million in public relations and media costs stemming from reputational damage–related events.

Of course, the choice of the most appropriate reputational risk treatment strategy should be supported by a cost-benefit analysis, which should take into account the time horizons regarding both the impact of the risk event on reputation and the implementation of the risk response, the resources required for the chosen risk treatment, and the consistency of the chosen risk treatment strategy with the organization's long-term objectives.

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See Also: Public Image; Risk Analysis; Risk Assessment; Risk Treatment; Stakeholders.

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Residual Risk

The presence of residual risk is a function of the reality that risk management is not synonymous with complete risk eradication, which is almost never feasible. Although its definitions vary across the range of settings in which it manifests, generally speaking, residual risk is the acceptable level of risk that remains after technology or other controls have been applied. Since the residual risk is both measured and known, its presence necessitates the need for further decisions about control, which can include the layering of additional control mechanisms until the system in aggregate reaches the desired level of risk.

The Politics of Residual Risk

The establishment of the acceptable residual is itself a highly political decision, as are the subsequent decisions about mitigation and control. The process typically involves several factors, including an assessment of potential impact, the evaluation of alternative approaches, and the formulation of policy.

The political nature of the process is often highly contested, particularly in cases where it involves the imposition of regulation on industry. Environmental regulation is a case in point. The Clean Air Act of 1970 included a requirement that the Environmental Protection Agency (EPA) develop a list of dangerous airborne toxins (hazardous air pollutants, or HAPs), as well as standards for the control of their emissions given an unspecified “ample margin of safety.” By leaving the entire process to the discretion of the EPA, however, the Clean Air Act resulted in a long-running conflict between industry, environmentalists, and the EPA over how to interpret this broad mandate.

The 1990 revision to the Clean Air Act attempted to address the issue by requiring the EPA to follow a two-stage approach to the definition and management of residual risk. First, the agency is required to establish technological risk controls based on minimum achievable control technology (MACT) criteria, taking into account the need to balance cost against effectiveness. The measurable risk that remains after the application of this technology is the “residual,” for which the EPA is required to establish limits based on health assessments. These residual risk limits also operate at two levels by mandating protections for the general population (through total population risk assessments) as well as for those most likely to be affected (through maximum individual risk, or MIR, assessments).

The establishment of standards can be illustrated by the EPA’s approach to benzene emissions, which are known to cause cancer. In keeping with the act’s requirements for cancer-causing agents, the total population standards require that the risk of contracting cancer be no greater than one in one million for the general population. For the MIR, the EPA determined that the risk to those living closest to the source of emissions should not exceed one in 10,000, based on an assumption of constant exposure over 70 years.

Residual Risk Transfer Mechanisms

The management of residual risk can also involve the transfer of risks to parties better equipped to handle them, often through some form of insurance. Insurance markets typically include a distribution of potential risks. Although insurance companies will cover most of these, every market includes a range of risks that for one reason or another are not profitable for the insurer. These can include drivers with poor records, companies with poor repayment histories, or even homes in areas vulnerable to hurricanes or flooding. The markets for insuring these risks are called “residual markets.”

Given the lack of sufficient incentives for private-sector providers to enter residual markets, solutions tend to involve some level of government participation. In many cases, these structures are established by state governments to foster the pooling and sharing of risk across a combination of multiple private insurers. One such structure is the joint underwriting association, in which one firm serves as the client-facing servicing agent but all premiums and benefit payments (and thus risks) are allocated proportionally among the entire set of insurers operating in the market. Other states have taken a different approach by establishing reinsurance facilities. Under this structure, individual insurers are required to offer coverage to all within a given market but have the option of “ceding” each policy’s premiums and risk to a separate reinsurance facility if they believe the policy provides inadequate premium compensation for the risk.

In other cases, state governments provide insurance solutions that cover all members, residual and nonresidual alike. Among the most widespread of these entities are statewide workers, compensation funds. Coastal states such as Florida are also active in this market because of the combination of catastrophic weather risk to homeowner and business property and the unwillingness of private insurers to cover this risk.

Financialization and Residual Risk

The growing markets for securitized risks (those transformed into investable securities) has expanded the possible set of tools for the management of residual risks. For insurance companies, the catastrophic (CAT) bond market presents a means of tapping global capital markets to fund payouts in the event of unpredictable and catastrophic events that would otherwise be difficult to provision for.

Financial portfolio investors have also made extensive use of new derivative contract structures designed to manage company-specific risk that was previously not possible to hedge. Credit default swaps (CDS) allow investors to focus on the credit risk of a particular company, which is the portion that remains after hedging away the risk stemming from the impact of the company's industry, location, and other more general characteristics. Although these securities have become controversial because of their role in the financial crisis of 2008, they remain an important tool for professional investors.

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See Also: Civil Protection; Hazard Vulnerability Analysis; Insurance; Maximum Acceptable Outage; Reinsurance; Risk Assessment.

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Resiliency

The term *resiliency* in the context of crisis management describes the capacity over time of a system, organization, community, or individual to create, change, and implement multiple adaptive actions, procedures, and processes in the face of various types of crises.

Prior to the growing usage of resiliency in the various fields of social and management sciences, this term was developed in the natural sciences and engineering and referred to the capacity of a material or a system to return to equilibrium after a displacement.

Effective human systems should also be characterized by these adaptive capacities to confront crises in a rapid, comprehensive, and adaptive way. A high level of resiliency may be achieved only through continuous processes and ongoing efforts. Resiliency is constructed gradually over time but may be tested in any single moment without any warning by any type of crisis. Analysis of functioning in a certain crisis may lead to important lessons regarding the actual level of resiliency and derive conclusions for its further improvement. The level of resiliency is analyzed regarding human systems, such as organizations, communities, or societies as a whole; it is not enough that the stronger elements are resilient by themselves. It is necessary that all the elements of a system will be resilient in the face of the crisis

I'M ~~COMING~~
BACK!
REBUILDING NEIGHBORHOODS
MINOT AREA
RECOVERY FUND
ND Bankers Association - Minot Area Banks

The owners of this home in Minot, North Dakota, which was evacuated during the historic June 2011 Souris River flooding, update their residential status in October. Federal Emergency Management Agency officials survey the area in the background. In the context of crisis management, resiliency describes the capacity of a system, organization, community, or individual to respond to crisis in multiple positive ways. As Minot resident SuAnne Drawz stated during the flood, resiliency "is just part of the fabric of life up here."

because otherwise the less-resilient elements will substantially weaken the functioning of the system as a whole. The increase of resiliency of all the elements and groups is a substantial challenge because it requires allocation of multiple resources (mainly budget, planning, and time) and differential approaches to various groups (such as immigrants, people with disabilities, children, and the elderly), given their unique characteristics and gaps in terms of resiliency. However, the above efforts will enable a significant increase of resiliency of the systems as a whole and may determine whether the organization, community, or society will be able to cope with the crisis or not. Accordingly, the meaning of resiliency should not be underestimated. In addition, it should be mentioned that the level of connectivity of individuals, organizations, and communities with other individuals or entities may also highly influence the level of resiliency. The strong networks established with others may provide additional knowledge, experience, and continuous support—prior to and during the crisis—plus an additional origin of resources and more. These assets may enable individuals, organizations, and communities to implement the required adaptive actions that are the core element of resiliency.

In addition to connectivity, achievement of a high level of resiliency depends also on the ability for innovation and creative thinking. In the constantly changing world, a crisis may imply a substantial challenge and threat for the existing structure. Those individuals, communities, and organizations that are willing and able to innovate have a greater potential to confront the crisis and to relate to it as an opportunity for further growth and development.

It should be mentioned that although in any type of crisis, the resilient functioning will be based on the same above principles, it is not possible to conclude from the level of resiliency of individual, organization, or community in one type of crisis regarding the extent of resiliency in the face of another crisis of different type. The specific context and the unique characteristics of the crisis, past experiences that are relevant to it, timing, the scope of the crisis, and more—all of these factors highly influence the specific level of resiliency in any given crisis. Accordingly, it is more accurate to analyze and describe the resiliency in a specific context and not any "general" level of resiliency.

In addition to the description of the notion of resiliency itself, a number of main factors that are related to the level of resiliency should be mentioned. The economic conditions of an individual, an organization, or a community influence the level of resiliency, namely, the higher level of economic resources enables more adaptive and rapid response in the face of a crisis. In addition, a provision of relevant and accurate information by the authorities also fosters higher levels of resiliency among the population in times of crisis. Another factor that may increase resiliency level is mutual assistance and support among the community members. An additional important factor that is related to the level of resiliency deals with perception regarding the leaders. If leaders in the organization or community are perceived as responsible, trustful, and reliable, then the level of resiliency in those systems will be higher.

Another important element that should be mentioned in the context of resiliency is the level of cooperation among the stakeholders who are relevant for a specific crisis. The more relevant stakeholders will be actively involved, the higher level of resiliency will be achieved. Effective cooperation in advance and during the crisis will enable more comprehensive, adaptive, rapid, and effective action.

Resiliency Procedures

Effective programs aimed to increase community or organizational resiliency are primarily based on the following procedures and best practices: consolidation of a clear vision and context for resiliency enhancement by the leaders and top echelon of the organization; definition and achievement of high resiliency as a strategic priority; active participation of most segments of the collective in planning, implementation, and evaluation; a duration lasting multiple years; periodic formal evaluation through integration of internal and external inputs and continuous professional consultation throughout the process by specialists in the field; and the conduct of periodic drills and simulations to test the actual level of resiliency during the implementation of the project and to increase resiliency after its completion.

In general, it may be said that resiliency is an important notion in the field of crisis management. It describes the capacity of an individual, an organization, or a community to take adaptive actions in the face of a certain crisis. There is a strong link between the terms *preparedness* and *resiliency*. Similar measures should be taken in order to achieve high levels of both. Usually, when the level of preparedness is high, the level of resiliency will also be high and vice versa. The notion of resiliency expands our understanding of the crisis management processes. It stresses the importance of effective adaptation to the new reality that was caused by the crisis. Increase of the extent of resiliency on individual, organizational, community, and societal levels through various continuous processes may strengthen in a significant way the entire structure of crisis management.

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See Also: Contingency Planning; Coordination; Coping Capacity and Response Capability; Disaster Recovery Life Cycle; Preparedness; Recovery; Response; Stakeholders.

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Resource Collapse

A resource collapse occurs when a particular resource, whether it be a food source that is plant or animal, or a material needed to carry out the normal functions of civilization, is no longer available, or is not available in the quantities needed. Oil has been a topic of discussion in the last decades, with the concern that the time of peak oil—when oil can be obtained easily for a reasonable price—is over. Possibly the most dramatic resource collapse has been the severe declines of the fish stocks in the northwestern Atlantic. Other examples of resource collapse are evident with needed minerals that can no longer be easily obtained. Rare earths are one example of substances crucial to modern manufacturing that are limited in supply and are controlled by only a few suppliers. Every finite resource is subject to eventual collapse. Resource collapse can lead to disruption of economies and can even lead to human disasters. Resource collapse has been suggested as one of the possible causes of the fall of the Roman Empire. Crisis managers must work to prevent resource collapse, must handle the collapse itself, and must deal with the aftermath when a collapse is over.

Causes of Resource Collapse

Overharvesting is one of the frequently cited factors in a resource collapse. Even renewable resources like water, animals, and forests are subject to collapse through overharvesting and ecological changes. Fresh water can be in danger of resource collapse through overuse of underground aquifers and flowing water and because of climatic changes. We face the constant challenge of a collapse of oil supplies. Depletion of the easy-to-find oil reserves has led to more expensive exploration like deeper ocean drilling. Overhunting and loss of habitat led to a resource collapse in the passenger pigeon population, leading to the extinction of the species. Laws aimed at protecting the pigeon were passed too late and were often not enforced. This species needed large numbers living in close proximity to each other to continue breeding. The near extinction of the American bison is a well-known example of a resource collapse. This species, which existed in massive numbers, provided well for Native Americans. The move westward of settlers and hunters led to the slaughter of millions of these animals and the removal of reproducing herds from most of the United States. Only limited herds existed by the beginning of the 20th century.

One of the theories of resource collapse is the "tragedy of the commons." Based on the grazing of cattle on common pastures, this theory deals with some of the social implications of natural resources that are held in common, like air, water, and public pastures. It is to the financial benefit of those who use these common resources to use them as much as possible. Even when a resource begins to decline and it would promote sustainability for individuals to reduce their consumption of it, users continue or even increase their usage. This is because there is competition for the resource, and if one user reduced consumption, others would just use what the one person had sacrificed.

Some resources are nonrenewable. Fossil fuels, along with minerals, are classic examples of these types of resources. Throughout history, humankind has learned to adapt to the ebb and decline of resources. Often, the unavailability has been dealt with by exploration, colonization, and trade. In modern times, technology has led to new methods to extract resources that were thought to be unreachable. Depending on the demand for the resource, the profit motive, along with the needs of society, has driven industrial interests to produce the resource for consumption. When a material seems unavailable or produces negative consequences, innovative entrepreneurs develop alternatives. We face a finite supply of fossil fuels, which are having a negative impact on Earth's environment. As a result, breakthroughs in nuclear, wind, solar, and geothermal energies have been made.

Crisis Management of Resource Collapse

An example of crisis management to prevent resource collapse was the legislation enacted in the fishing industry in U.S. waters, known as the Magnuson-Stevens Act. The United States passed this legislation in a number of stages beginning in 1976. The earlier versions were unsuccessful in preventing overfishing of several species of fish. The goal of the law was to benefit the economic and recreational aspects of fishing. This goal was

Case Study: The Collapse of the Newfoundland Cod Fishing Industry

The northern cod of the northwest Atlantic Ocean were so plentiful in the rich fisheries off the coast of Canada that they were said to have been gathered in a basket without using a net. The converging currents in this part of the ocean provided for a steady stream of food sources for groundfish like the cod. This rich, nutrient-filled water produced an abundance of fish like few places in the world. A vast fishing industry grew up around these waters, providing countless communities the majority of their jobs. The economy of eastern Canada was very dependent on the steady source of cod and other species that were plentiful. Fishing interests from all over the world recognized the treasure available in these waters and sent their fishing fleets to join in the harvest. It must have appeared to many in the fishing industry that the supply of codfish was limitless.

Industry Mismanagement and Regulation

As long as ships were slow and technology was not available to aid fish harvesting, the supply of groundfish held out. However, ships grew faster with the advent of engines. Ships could now travel to these plentiful waters from farther away. Increased mechanization made it possible for processing ships to freeze the fish, allowing more time for fishing and less time for travel to market. Technology made it possible to track schools of fish with accuracy. Concern over foreign fishing ships throughout the world led to the passage in 1977 of the United Nations Law of the Sea Convention. The convention established a 200-mile exclusion zone around many countries where foreign ships could not fish. The cod fisheries were protected by this action, but Canadian trawlers took advantage of the openings left by the exclusion. In addition, agreements were made that allowed foreign ships back into Canadian waters. Some trawlers were able to pull in 25,000 pounds of fish in one catch of their huge nets.

In 1977, Canada began aggressive management of the fishing stock in its waters. The nation licensed fishermen, set quotas for different types of fishing ships, and set a maximum catch each year for the fishing industry. It was obvious that the government managers of the fishing industry had mismanaged the fisheries. Based upon faulty data and assumptions, the government had let too many fish and too much fish be caught; it seemed that during the 1980s, the government saw the fish as an inexhaustible resource. Also, the political and social pressures related to the fishing industry and the jobs it created caused the government to even ignore some of the recommendations of its own scientists, who called for drastic reductions in the allowable catch. By the early 1990s, the catch of fish was drastically reduced and a resource collapse had occurred, with a 90 percent decline in fish catches.

In 1992, Canada placed a complete moratorium on fishing for cod in the waters off Newfoundland. By this time, the biomass of fish in the fishery was a tiny fraction of what it had been. The moratorium led to the loss of up to 12,000 jobs for fishermen and up to 15,000 factory jobs.

Assessment and Recovery

Those responsible for managing the industry had failed to issue fishing regulations that could have prevented such a collapse. Managers' calculations had been based on a number of inaccurate statistics, and scientists' projections of fish populations were much too optimistic. Fish harvests were underreported. Foreign fishermen caught fish near the Canadian waters. Some fishing practices were overly destructive, leading to the death of immature and nontarget fish. Ecological changes and changes in predator fish also reduced the fishing stocks.

There have been slight increases in cod fisheries in the 20 years since the moratorium was imposed. Despite the recovery, the number of cod is a very small percentage of what scientists say is necessary for a viable fishery. Even with some recovery of the fisheries, the market for Canadian fish is not good, and imports from other countries have made up for part of the difference. The U.S. seafood market, the market for most of the Canadian fisheries, declined because of the reduced price for competing protein sources like chicken. Newfoundland's human population has also dropped as a result: from 580,000 in the early 1990s to about 510,000 today.

attained by enforcing control of fisheries in U.S. territorial waters. Eight regional councils were established to give oversight to the fisheries under their control.

Issues related to resource collapse often are not limited to political boundaries. Transboundary crises are more complex than those that are limited to one political jurisdiction. Competing interests across political boundaries can complicate the response to a resource crisis. The interdependence of modern economic systems can lead to international crises when a resource collapse impacts even one country. The impact on the world economy was evident during the oil crisis of the early 1970s. When oil producing countries reduced their exports of oil temporarily, gasoline prices rose dramatically and there were gas shortages for months. As a result of this experience, the United States implemented a number of actions that would help ameliorate serious consequences should an oil shortage occur again. The most visible of these was the establishment of the Strategic Petroleum Reserve. By storing crude oil in underground salt domes along the Gulf Coast, a reserve was created to be used when the regular supply of crude was not available.

The 1973 Endangered Species Act was one method of dealing with crises involving species that might not be in imminent danger of extinction but nonetheless needed protection. In 1993, then-Secretary of the Interior Bruce Babbitt called for using the Florida Everglades as an experiment in protecting an entire ecosystem. This was an effort to do pre-crisis management in order for species to receive protection before they became endangered, and to help stave off some of the conflict between environmentalists and business interests before the situation became more critical.

To be most effective in dealing with resource collapse, crisis managers must prepare before a crisis emerges. This is difficult because many do not want to take painful steps to avert a crisis when they are not currently facing the consequences of the crisis. Preparations can be expensive, both in time and in providing needed training. Some resource collapse scenarios are hard to imagine in a time of plenty. Even when the crisis begins to develop, organizations are often slow to realize the reality of the current situation. Organizational structures are not easily modified to be proactive.

In dealing with resource collapses, crisis managers must be prepared to deal with networks. Decisions are often made in networking environments. Prior to a crisis, managers must deal with communication issues so that the crisis is not exacerbated by a failure in lines of communication. Managers must be prepared to offer the public numerous assessments of the situation. Being able to give reasonable answers to myriad questions is necessary to instill confidence. Post-crisis action is also essential to deal with failures experienced during the resource collapse. This action is complicated by political and societal pressures.

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See Also: Climate Change Adaptation; Commodity Shortages; Deforestation; Environmental Contamination; Famine; Food Security; Freshwater Demands and Shortages; Global Food Crisis; Overfishing; Overgrazing; Overpopulation; Resource Management; Sustainability.

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Resource Management

Resource management can be defined as the art and activity of efficient and effective use of institutional or organizational resources in response to and anticipation of need. *Resources* as a term covers a range of items, including tangible resources such as an organization's equipment, human resources such as employees, and also volunteers within charitable organizations and nonprofits. Further to this, resources may include intangible aspects such as ideas relating to the timely availability of resources or when they need to be used.

Managing resources when a crisis is triggered by risks is even more challenging, as the need suddenly arises to make urgent and timely decisions to eliminate or minimize the undesirable effect, and impact, of a crisis. Despite good planning, extrapolation or forecasting external or internal circumstances beyond one's control may threaten the availability of resources for the effective and efficient implementation of a project or bring it to a catastrophic end.

Challenges: External or Internal

Thus, every organization, whether business or nonprofit, needs to be effective and efficient in managing resources if it is to successfully achieve its mission or have a competitive advantage in its market. Similarly, any initiative or task planned or undertaken by organizations in the form of a project or a task cannot be deemed successful unless serious consideration for sustainable, timely, relevant, cost-efficient, targeted, and appropriate use of resources has been made. Resource estimation, supply, and project human resource management are critical to organizations' operations. Yet it is also true that even the best planned and rehearsed project may abruptly face crisis and falter at the first hurdle, triggered by system failures. Contingency plans, though extremely important, may not always provide the desired outcome, as these are normally developed with certain assumptions. As a result, projects or organizations facing crisis in resource management may descend into an undesirable set of events that may prove financially catastrophic and damage an organization's reputation. The discussion below identifies some of the tools for resource management and also gives the rationale for utilizing these tools and techniques. Effective resource management can assist managers, planners, and crisis management teams to minimize the possibilities of underperformance by maximizing efficiency, even at difficult times, to achieve the organization's objectives.

Human Resources and Crisis

Research has shown that one of the most critical resources for both for-profit and nonprofit organizations is their employees. In fact, one of the biggest expenditures of an organization is that of salaries and related expenditures in efforts to keep employees in an organization or project. This may explain why reputable companies such as Google place much effort on this by the provision of a workplace culture that promotes effective employer-employee relations. In addition to employees, volunteers constitute part of human resources and are of equal importance to employees within charitable organizations. Indeed, the effective use of human resources is the lifeblood of an organization or business. Employees are effectively the public face of an organization. Effective resource management will not end at the recruitment of persons into an organization or business but, more importantly, it will work for creating an environment for enabling synergetic interactions that are likely to yield effective decision capabilities in a crisis situation within the organization. Thus, effective human resources management in a crisis entails assessing, planning, training and professional development, and an oversight of employees' work-life balance needs.

Financial Management

Finance as a resource plays a very critical role in organizations or projects. Cash flow and availability of funds for a project or organization are critical to every organization's performance and survival. An organization suddenly encountering unforeseen poor cash flow in its system may encounter a very serious threat to its survival or the survival of projects it is managing.

In an attempt to maximize project and program performance, effective organizations aim at minimizing costs in the knowledge that, if these were left unchecked, they could trigger a cash flow crisis. Having a financial contingency scheme alone does not necessarily translate into insurance against crisis. The reason for suggesting that contingency planning does not necessarily lead to a crisis management strategy is that contingency planning involves a fair level of assumption built in at the beginning of a project or program relating to what might happen. The realities of crises are more complicated than neatly assumed crisis scenarios prior to a project commencing. Financial managers will, for example, work with some employees or a project team to identify the most cost-effective way to manage resources, including capital, development, or operating costs.

Whether it is a charity or a business making risky investment decisions, there are potential threats to the very mission and aim of an organization. Prior to the recession at the end of the first decade of the 21st century, for example, a number of local government authorities in the United Kingdom had made investments in what looked like robust investment funds in some institutions in Iceland. As economic problems plunged Iceland into financial troubles, in particular from about 2008, questions relating to resource management with regard to investment decisions started to be raised by the general public in the United Kingdom. It soon became obvious that some local government authority investment committees had not seriously considered crisis management issues prior to the investment and these were threatening to impact public trust in the local authorities.

Resource Allocation

Any project or program requires some resource allocation. Resource allocation involves identifying and allocating resources in an economic manner that is critical to an organization's ongoing projects, programs, and wider commitments. The rescheduling of activities and identification of resources, taking into account time frames for the project, and the levels and type of resources available are some of the central pillars of resource allocation. In order to deal with pressure points during project implementation, an effective project team needs to assess resource allocation. In project management, the use of a critical path analysis is likely to indicate when and where resources will be needed and when, roughly, work will stall without particular resources. Yet with all this planning and use of tools such as awareness of critical path analysis, there may be unexpected events that might render resource allocation exercises somewhat futile. It is during these sudden and critical points in time that crisis management plans, coordination processes, information acquisition, and systems and team synergy become especially critical in appreciating internal and external interactions and processes.

Strategic Planning

Another important aspect of resource management is how to engage in activities at the present point in time to address goals that are likely to arise in the future. This may require critical decisions such as identifying the type of activities to fund, at what level, and which aspects are likely not to need immediate funding or funding at all. Further to this, alongside this type of planning, difficult decisions are made, including, for instance, to start making critical decisions relating to the type of activity that may need to be left out in the event that the funding is inadequate. Although strategic planning is important, it does not remove the need for crisis management planning. Strategic plans for resources are themselves forecasts of situations at some point in the future. They are at times approximate assumptions of the project or organization but are unable to take into account external and internal unexpected situations.

Resource Leveling

This is a resource management technique that aims to ensure a realistic balance between resources on hand, minimizing the unwanted events of shortages and inventories. This may also entail some level of the demand of the required resources as well as estimating as far as possible the requirements into the future. The whole purpose is to meet maximum utilization, achieving maximum levels of services while minimizing costs. Even such plans are not immune from being derailed by unexpected crisis. Thus, preparing for how to prevent any unexpected situation from descending into a disaster within a project or organization is crucial.

Nongovernmental Organizations

Nongovernmental and voluntary organizations involved in development and humanitarian work have sometimes been known to be complacent in using resources and therefore unable to meet the needs of their donors effectively. It has been suggested that when a disaster happens, the urgent need and appeal for humanitarian aid in the form of funds, food, and nonfood items have often been undermined by criticisms of the way resources are utilized. As expected, because of heightened sensitivities associated with new disasters, it is often difficult and rare, particularly in the first stages of disaster response, to question the management of funds, food items, and nonfood items being donated for these purposes. However, there has been growing interest in the efficient and effective use of humanitarian relief in the past two decades. The availability of relief supplies in field hospitals following a disaster does not indicate the effectiveness of the particular humanitarian organization. Questions that might justifiably arise here are whether the supplies available are consistent with the emerging needs brought about by unexpected turns as the primary or initial needs of a disaster are being addressed. It may well be that supplies initially deemed appropriate or prepositioned for a particular place may suddenly prove wholly inappropriate because of the nature of the need. Following the 1994 Rwanda refugee crisis, a number of international organizations responded with humanitarian supplies. Although this was a natural response expected of relief organizations, it soon became clear in the field that poor assessments had been made in places where the humanitarian supplies were being delivered. Indeed, in Kigali there was oversupply of one type of supplies that would have been more beneficial elsewhere in the country and appropriate to the real needs on the ground.

Critical to resource management are key issues around information systems, the nature of interactions between a range of staff or actors involved in managing organization or project resources directly or indirectly. Robust collaboration among humanitarian organizations may, for example, be beneficial in times when the organization itself is experiencing a crisis.

Crisis management plans may be useful if, for example, they address issues around the decision-making processes, and the nature of interactions internal to and outside the organization, and draw some standardized frameworks for approaching and dealing with crisis.

It would be perhaps misleading to discuss resource management without mentioning natural resources. Natural resources are critical as inputs to an organization's production within a project or organization if negligence prevails; this can be reason for a tarnished reputation for some projects or organizations. For this reason, it is important and critical that crisis management strategies take into consideration issues about the organization or project interface with sustainable development or corporate social responsibility obligations. Doing so can save much damage that can otherwise arise from unforeseen crisis situations arising from public concern about an organization's use of natural resources.

Conclusion

The above discussion is by no means exhaustive. In conclusion, crisis management planning and preparedness in relation to an organization's or project's resources are themselves hallmarks of good business practice. Despite good planning, projections, and forecasting, sudden events can overwhelm an organization and culminate in a catastrophe, either financially or in terms of reputation. Designing crisis management mechanisms and frameworks either for reputational or business continuity management reasons requires an understanding of and ability to implement robust information and communication processes and systems that can support decision making during crisis situations. Indeed, team cooperation, training of staff, and transferability of crisis management strategies from one situation to another may need thorough reflection. They may also involve a general framework around which a crisis team may base its response to a resource crisis.

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See Also: Contingency Planning; Preparedness; Resource Collapse; Response; Strategic Plans; Supply Chain.

Further Readings

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Response

Response refers to the activities undertaken to counteract the further escalation of a set of events that potentially leads to crisis or disaster. The single most important issue at this point in time ceases to be about planning for some once-distant and unknown disaster; instead, the focus at this stage is to ameliorate the worst effects of an emergency crisis or disaster situation. For this reason, response will comprise activities, often attempts or interventions, aimed at changing the trajectory of a worsening situation.

Crisis makes response necessary. Response-—the actions taken to minimize damage—has to be managed. This has resulted in the growth of crisis management studies in recent years. Crisis management, popularized by former U.S. Secretary of Defense Robert McNamara, refers to the management and coordination of activities meant to counteract threats or harm with a view to saving lives, property, services, reputation, or image. Thus, staff members of organizations and sometimes of communities who act and react to minimize the worst excesses of harm are called "responders."

An outbreak of a deadly disease pandemic will need some response involving the mobilization of paramedic or medical personnel. An earthquake disaster of high magnitude striking a city may destroy buildings in the affected area, and thousands of people may have been buried under the rubble and debris or sustained injuries from falling masonry. Faced with these sets of events, it becomes imperative for search and rescue dog handlers to be involved in saving survivors. Thus, it may be necessary to set up field hospitals to cope with the high demand for medical services. During disasters, Critical National Infrastructures (CNI) such as electricity and water supply systems may have sustained severe damage or been severely compromised, such that closing some facilities down until they can operate safely may be necessary to minimize the worst effects of the disaster. A plane suddenly disappearing from the radar screen may necessitate appropriate emergency response in case the plane has crashed. A house or forest catching fire may need fire engines to stop the fire from spreading. A region that had experienced prolonged periods of drought may suddenly display a dramatic change for the worse in the state of food supply availability, resulting in severe food shortages and hunger that may result in the need for emergency food aid, including Ready-to-Use-Therapeutic Foods (RUTF) to combat malnutrition. Thus, emergency relief is part of response.

Why Study Response in Crisis Management?

It would be pointless to discuss response in crisis management unless one first reflects on a range of reasons why this subject is important, including:

- It is human instinct to try to save lives, protect property, and sustain services in the midst of a crisis.
- Haphazard approaches to and during disasters can be very resource-consuming as responders devise the most effective way out of the crisis; therefore, well-managed response activities are important.
- The acknowledgment that there will always be disasters and the need to respond to them efficiently and effectively.
- The reputation of governments, emergency response organizations, and agencies can either be damaged or restored depending on the level and quality of services offered to the affected community during crisis.
- There are high expectations from victims, affected communities, and the international communities regarding the need for a high level of competency in delivering services.
- There is a growing body of evidence from studies demonstrating that although crises cannot be totally prevented, aspects of events during crisis situations can be influenced.

Responders, Communities, and Institutions

The immediate reaction to emergency crises or disasters by most national governments, nongovernmental organizations, agencies, communities, and individuals is to engage in some kind of response activities. Local communities in many parts of the world often respond immediately to human suffering within their own area. Often during emergency crises, such as flooding, food shortages, or earthquakes, local communities are the first to engage in or launch some kind of response. There is some evidence, for example, that in areas prone to earthquakes, including parts of Turkey,

A Haitian boy watches as inflatable boats from U.S. Navy amphibious dock landing ships arrive ashore at the New Hope Mission at Bonel, Haiti, January 19, 2010. The ships were part of Operation Unified Response, a joint humanitarian assistance mission to the island nation that was devastated by an earthquake on January 10. The large-scale, highly funded international response involved a wide range of actors with varying degrees of experience in humanitarian response, urban crises, and coordination.

Iran, and Pakistan, when a disaster strikes, a significant number of survivors have often been recovered from the rubble by local communities themselves in advance of external assistance being mobilized. Indeed, in certain cases the first hospitality and supplies, though sometimes modest in quantity and quality, come from either the affected or neighboring communities.

Although the discussion above acknowledges tendencies of instinctive response efforts to crisis events from within communities, people's initial behavior in such events within an institutional context is not radically dissimilar. Just as is the case within a community setting, response to crisis in institutions is characterized by individuals instinctively taking steps to manage crisis.

Professionalizing Response and Frameworks

The increased trend toward professionalization in crisis response has meant that the invaluable contribution to crisis by communities and individuals has significantly lost its traditional visibility and recognition. In recent years, there has been a heightened emphasis on efficiency and effectiveness in managing crisis. The term *efficiency* in its general sense means assessing and determining the extent to which inputs such as materials and labor directed, in this case, toward a crisis can bring about the desired or near-desired outcome. Another factor that has been suggested for the push toward professionalization of crisis response is effectiveness. Effectiveness as a term refers to the impact likely to be achieved by a set of actions.

Both the above-mentioned terms, effectiveness and efficiency, derive from management thinking, which has been critical in shaping modern crisis response. The concept of management has generally been described as the processes and systems for mobilizing, directing, commanding, and organizing both human and physical resources within an institution or organizational context aimed at delivering intended objectives. Wherever management as a science or art is discussed, factors around planning, control, communication, forecasting, coordination, and motivation are regarded as crucial to success. Yet emergency crisis seem to be the antithesis of planning and control when one considers the element of surprise attributed to emergencies, whereby response to crisis is generally undertaken in haste. The growing consensus in the past few decades, however, has been that crisis response needs professionalization through embracing relevant managerial perspectives and tools to inform response to crisis.

Incident response, from a crisis management point of view, can be appreciated by examining the theory that underpins disasters and crises. On the surface, it may seem that response is an isolated activity that entails reacting to incidents. As crises and disasters seem to be sudden occurrences, some may argue that poor decision making during response needs to be tolerated. After all, information gleaned during the initial stages of a crisis or disaster is often patchy and sporadic. Yet there are known issues regarding competencies in crisis response that have been researched over decades and challenge the view that the apparent suddenness of disaster incidents need not necessarily lead to poor decision making. Although there is indeed some justification in suggesting that natural and human-made disasters can have a large degree of unpredictability, there increasingly are studies which suggest that response can be managed effectively. There is an overwhelming consensus among researchers that disasters generally follow a certain trajectory and that appreciating this contribution to crisis management theory has the potential to minimize damage and shape response. An approach that takes into account the knowledge of events leading to a disaster is likely to be effective and to add value to proficiency during response. Crises and disasters have been known to roughly follow or have an element of the stages detailed below:

- *Pre-event stage:* Before the emergency crisis stage can be reached, normally there is a period of relative or perceived calm. During this stage, effective organizations, institutions, and governments will focus on strategic and macro issues including, for example, emergency disaster planning and devising policy frameworks and systems for minimizing disasters.
- *Prodromal stage:* This is the stage of birth pains, when evidence may be building of impending crisis. At this stage, normal planning and extrapolations previously directed at some possible future disasters by emergency staff ceases, and signs of trouble on the horizon are evident. Most crises have warning markers or indicators.
- *Emergency stage:* This is perhaps the most publicized stage of a crisis, the period when response actions must happen, the last-minute chance to avert the course of events, a period "when heroic stories are conceived, heroines and heroes are made or born," as the media has a heightened interest in covering stories at this point, more so than at any other stage in the disaster trajectory. This is a period when reputations of an organization or government can either be made or drastically destroyed.
- *Post-emergency stages:* This is the period of rehabilitation and restoration of critical community services, when people want to move on and resume normal lives.

Some understanding of issues and the trajectory around crises can be beneficial to incident crisis management during incident response. Some necessary strategic actions undertaken during the pre-event stage, for example, may positively help by minimizing the level of risk involved during response and bring some stability. Systems designed in normal times may prove vital launching pads for response when disaster strikes, and information gathered and communication systems designed during pre-event and sometimes prodromal stages may compensate in some way for gaps normally experienced during the response stages.

The World Food Programme

Perhaps it is important to illuminate crisis management response by briefly examining some of the most effective institutional machinery that operates in many parts of the world. The United Nations' World Food Programme (WFP) is the world's largest humanitarian response agency and has proved extremely efficient and effective, operating 60 aircraft, 40 ships. and 5,000 trucks every day. The agency has rapidly, effectively, and constantly delivered food assistance during emergencies worldwide. Within 24 to 48 hours, the WFP has the capability and systems to deliver food assistance anywhere in the world. When one examines the World Food Programme, it becomes clear that the efficiency and effectiveness of the agency do not merely start and end at delivery point. The WFP crisis management strategy to support emergency response is coherent, well integrated both within WFP internal teams and horizontally within the agency's interaction with response partnership arrangements that together, in their totality, consistently deliver. WFP works with about 3,000 nongovernmental organizations at local and international levels.

The World Food Programme engages in a proactive strategy to manage emergency crises. Through its logistics unit, the Augmented Logistics Intervention Team for Emergencies (ALITE), the agency pursues an evidently agile coordination and communication strategy. Indeed, the unit comes into its own when it becomes necessary to coordinate civil and defense assets to overcome logistical bottlenecks in humanitarian emergency operations. ALITE ensures that coordination and communication are effective and efficient among the range of entities and ensures interoperability of its strategies in a range of contexts. As an organization that is aware of its mission and the loss of confidence and reputation that crisis can bring, it carefully plans and makes reliable assessments for crisis and is able to discern and even negotiate the unavoidable differences in characteristics of one crisis response situation from another.

Considering that the lead time—the period it takes to deliver food aid from collection of food from donors (and markets) to reach those in need—is about four months, the WFP enlists quicker solutions by obtaining emergency food stocks. Aware that delays during crisis moments may cost lives and the agency's reputation, the WFP engages "virtual food stocks." The agency assesses a range of options including utilizing prepositioned stocks afloat reserves, which involves directing food from the 200 to 250 ships it charters each year. These reserves can be redirected to a range of locations in the world to parts of the world affected by famine. Sometimes WFP opts to temporarily draw from food that was initially meant for development aid and replace it when the emergency stocks arrive. In addition, considering that countries are encouraged to plan for reserve food stocks, the WFP engages in advance bilateral agreements with the affected governments and can therefore utilize in-country food borrowing facilities and agreements to address emergency crises. Such arrangements and the opening of such options enable WFP to be versatile when a crisis emerges. These advance arrangements are vital for counteracting hostile field and operational conditions that can conspire to create catastrophic failures or multiple failures in WFP's operations.

Crisis situations can present a complex set of problems that may go beyond the internal capability of an emergency responder. Indeed, critical aspects of emergency, such as port operations and repair of critical infrastructure including road or airstrip repairs, have a high potential to significantly hinder or halt crisis response. Thus, WFP has standby arrangements with governments and nongovernmental organizations to help provide the required logistics when called for. WFP also engages its logistics network, the United Nations Humanitarian Response Depot (UNHRD), to serve itself and the wider humanitarian community, enabling it to organize depots for prepositioning its humanitarian supplies and supply equipment. This facility has enabled WFP to strategically engage hubs, whereby supplies and supply equipment are placed at a range of locations worldwide, including in Malaysia, Panama, Italy, United Arab Emirates, and Ghana, providing the agency with the required flexibility during crisis.

Examined as a whole, the WFP strategy is coherent and operates well because it recognizes possible bottlenecks internally and externally. WFP's success partly lies in the timely auditing of its capabilities and its ability to take appropriate actions both in advance and in real time to address gaps. Thus, for example, surge capacity, the ability to deploy enough resources on short notice, is well monitored and managed. Indeed, alertness in managing surge capacity, coordination, communication, knowledge dissemination, and strategic maneuvering of supplies and supply equipment are the hallmarks of an effective and efficient crisis management organization.

Tanzania and Sub-Saharan Africa

Further appreciation of the challenges in crisis management can be found by examining another case study that may assist and help provoke policy makers and crisis managers to engage in further reflection. Most countries in the southern African region became independent nations in the past four decades, and since then their focus has been on development. The region is witnessing rapid urbanization and population growth, with half of the population expected to have migrated to urban areas by the end of the first quarter of the 21st century. Spiraling slums punctuated by unplanned housing are becoming characteristic of many of the towns and cities. Poorly enforced planning and building regulations have resulted in buildings collapsing and incidents of fire. Pressures on transportation systems are evident, and government enforcement and regulation of these systems in the region has been patchy and sporadic. In the meantime, natural and human-made crises are commonplace. In the past decade, there have been fire incidents in supermarkets in Nairobi, Kenya; capsizing boats in the Democratic Republic of Congo and Tanzania; and flooding in Uganda, Kenya, Tanzania, and Malawi. Against this background, there is evidence of a lack of adequate enforcement of marine laws and road vehicle regulations, along with a general lack of preparedness with regard to crisis management in most of the southern African countries. Even worse is the quality of incidence response when crisis occurs.

One case study of an incident in the Dar es Salaam region of Tanzania sheds some light on lessons learned from crisis management. The mainland of Tanzania has experienced a different set of crises within the past three decades. The most notable crises that have faced Tanzania have been the terrorist attacks at the U.S. embassy in Dar es Salaam in August 1998 and the military dump related explosions in 2009 and 2011. In addition, two ships sank within months of each other in 2011 and 2012. The country has also faced flash flooding, but like many African countries, there has been evidence of neither early warning systems nor emergency response mechanisms. Like many other sub-Saharan countries, it would seem that some kind of emergency preparedness is somewhat visible around airports, where one can witness some fire engines; at the hospitals, where one can witness some ambulances; at police stations, where police duty response vehicles are evident; and at the seaport of Dar as Salaam, where there is some response capacity. Outside these identified organizations and places, one realizes just how inadequate the configuration of crisis response services is within Tanzania.

The above-described circumstances point to a range of weaknesses in both crisis management planning and resourcefulness characteristic of many countries in sub-Saharan Africa, including Tanzania. It seems that most countries, except parts of the Republic of South Africa, are underprepared for managing emergency crisis situations. Interestingly, lack of enforcement of planning and building regulations, the large populations in cities resulting from urbanization, the critical need for public transport, and the chase for development without comparable systems to counter risks all conspire to increase risk hazards in these countries. Upon close examination, there is also some evidence in Tanzania, as in many other African countries, of fatalistic tendencies in which "accidents" are sometimes attributed to be unavoidable, uncontrollable, and merely acts of God.

Tsunami Evacuation in Dar es Salaam

A specific case of incident response that occurred in April 2012 in the city of Dar es Salaam, the capital of Tanzania, underlines some marked shortcomings in the city's disaster response mechanisms. A tsunami alert had been issued by the international community regarding what was perceived as a tsunami similar to the devastating 2004 Indian Ocean earthquake and tsunami. Tanzania, and in particular Dar es Salaam, seemed to be particularly vulnerable to flooding waves, as the city is on the shores of the Indian Ocean. About three to four hours prior to the time the wave was roughly projected to hit the shores, social networks and local radio stations started announcing an impending tsunami, rather than broadcasting warning messages. This immediately heightened the sense of danger and panic in the city, and immediately tension began to show. Despite having been in a similar situation during the Indian Ocean tsunami in 2004, it was apparent that lessons from that earlier crisis had not been sufficiently learned and that disaster forecasting and recovery planning had not been undertaken to manage such a crisis efficiently.

Dar es Salaam was soon gridlocked, as traffic headed in every direction, not necessarily the expected direction, away from the sea. Like many cities in the world, during most weekdays traffic flow is problematic in Dar es Salaam. Following uncoordinated messages about the imminent and unknown effects of the warning was self-evacuation, which became haphazard and wholly chaotic. Compounded by patchy, incomplete pieces of information from somewhat distant memories of the destructive effects of the 2004 Indian Ocean tsunami, the uncoordinated evacuation turned into yet another hazard by itself and therefore was counterproductive to crisis response. As people attempted to flee from impending danger, they disregarded traffic lighting systems, and as a result, traffic on city roads became gridlocked; not enough traffic personnel had been mobilized to manage the crisis.

In Dar es Salaam, there was evidence of neither an evacuation plan nor effective response mechanisms. During a crisis management situation, it would be common to engage in vertical evacuation, by which potential victims are relocated from threatened parts of a city or area to upper areas of the same physical structure. Alternatively, responders may engage in site evacuation or horizontal evacuation, by which potential victims threatened by an isolated social incident are relocated to a structure or place less threatened by the incident. Thus, one should have expected some advance planning for either emergency shelters or temporary shelters. Emergency shelters, sometimes known as shelters of last resort, are planned to be occupied on a very short-term basis lasting a few hours, whereas temporary shelters may be appropriate for stays lasting a few hours to about two weeks. It may also be that community evacuation, whereby whole populations move from the vulnerable area, in this case the city of Dar es Salaam, to another tsunami-free area would have been appropriate. These are decisions that trained responders may need to make depending on information available to them.

The tsunami alert evacuation in Dar es Salaam was compounded by other factors prevalent in poorly planned disaster situations. Contributing to the chaos and traffic jam in the city were attempts by parents to unite with members of their families, most commonly their children who had been attending schools near the seafront. This attempt to unite parents and their children was compounded by the schools' lack of knowledge about how to manage this situation and evacuate to safety. Similar responses are common in many disaster crisis situations in which community disaster response planning is not undertaken in advance of disaster crisis. Contrary to what would have been expected in such a situation, parents were in effect heading in the direction of the wave on their way to pick up their children before evacuating together.

Upon examination of the situation, there were issues that were seriously counterproductive to effective response in a crisis, including:

- *Planning:* The area lacked a clear framework to guide crisis management.
- *Early warning systems:* There was no evidence of ability to forecast the crisis or of effective early warning systems.
- *Transport:* Most people in Dar es Salaam using public transport and private taxis could not be expected to engage in evacuation because of heightened fear. Transport should have been arranged by authorities, which would have led to more efficient and timely evacuation.
- *Traffic control:* In normal times, there are traffic jams. Given the context and fear of the tsunami, mobilization of large numbers (the ability to manage surge capacity) of emergency and crisis-trained traffic officers would have been beneficial for managed evacuation.
- *Meaningful warning systems and messages:* Although messages were available in some media sources about the impending tsunami and its possible effects on Dar es Salaam, the messages were incomplete, as the community received information from multiple unofficial sources, and this information could not be properly acted upon. Critical questions were left unanswered by self-evacuating communities, such as: Where should those evacuating be heading for safety? Who would help them with issues regarding

> transport in a city where the majority of people do not have their own means of travel? Where would people obtain additional information relating to their particular needs if required? How and where would people obtain updates? What should they have done if they had been separated from family members or their children are at school?

Fortunately, the tsunami flood and waves did not materialize in Dar es Salaam in April 2012. However, what this situation did expose was the weakness in crisis management systems within the Dar es Salaam region. The situation also highlighted possible post-evacuation shortcomings.

Learning From Crisis

Effective crisis management response systems have certain vital characteristics. Responders from a range of contexts need to share the full picture relating to their frameworks for incidence response, both strategic and operational. Indeed, an important aspect of incident response, particularly where many entities are involved, is to ensure interoperability of management and communication systems.

As for Dar-es-Salaam, the sharing of the emergency response picture is less evident and perhaps obscured. It would seem each responder was engaged in offering isolated and disparate response services. The most effective solution would have been an integrated emergency system. Furthermore, the framework for meeting costs (budgets) and sharing resources for emergency response had not been devised, and therefore it was not clear how any response activities would be shared and funded during the tsunami scare in order to unlock operational, communication, and coordination needs. Close examination of various parts of the emergency systems in the Dar es Salaam region also displayed tendencies that did not seem to foster sustainable mobilization of resources at different levels within the city to prepare to engage in effective emergency response. There were hardly any visible systems equipped with both technical and operational proficiency to promote disaster preparedness at both professional and community levels. Examined from another angle, it may be argued that both the community and the emergency services were not resilient to disasters, and their vulnerability was tested with the tsunami scare.

Every organization, government, or community needs to learn from a disaster. There is mounting evidence to suggest that the emergency team in Dar es Salaam has been learning from the disasters in recent years and continues to do so. In 2012, the region’s Multi Agency Emergency Response Team (Dar MAERT) was founded; this multiagency team aims to set up an incident response center in Dar es Salaam. Attempts are being made to model this center along the lines of, or with some characteristics of, the National Incident Management System in the United States, which is more integrated and effective. Despite scarce resources, there is strong evidence of the determination by Dar MAERT to ensure that an effective emergency system is implemented.

Crisis response in the sub-Saharan region as a whole would perhaps be more effective if there were panregional agreements, like in the European Union countries, whereby each country would provide resources and expertise that would be shared by all countries during emergencies within the region. It would also be beneficial to engage communities in crisis and disaster recovery planning. Indeed, crisis response knowledge need not necessarily be an exclusive preserve of the professional responders.

Success and Response

In conclusion, the science or art of managing crises, emergencies, or disasters is one that demands strategic and operational approaches that can carefully translate into effective responses when required rather than relying on ad hoc solutions. It would seem that whether in an organizational or community setting, the outcome of incident response can partly be attributed to strategic actions previously undertaken within the organization or community as part of disaster preparedness.

Every crisis situation is different. Every crisis response is impacted by both the time and context of the incident. Response to a crisis in a corporate context in which an information system has crashed will be different from a crisis related to a humanitarian context during famine. Crisis response in a failed state ravaged by war and with no working government structures will present additional and sometimes totally different variables to responders. However, there is a thread that runs through all successful crisis response teams, and this includes effective communication and information systems, effective coordination of activities, integrated response mechanisms, timely actions that will in turn save lives and services, clear decision-making systems, and a degree of flexibility, as incidents can be unpredictable.

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See Also: Backup Facility; Command and Control; Coordination; Crisis Communications; Decision Making; Early Warning Systems; Emergency Management System; Emergency Operations Center; Warning.

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Response Team

In their simplest form, recovery teams are teams of staff who have a role in the recovery of a business in a crisis event. They have certain skill sets that make them a key component in any business continuity or crisis recovery plan. Their skill sets may be site, or even process-specific, or they could have general skills that, if used well, will enable the recovery of business mission-crucial activities. In order for this to happen, the role of the team and its members must be documented and clearly defined. The staff should be trained in what is expected of them to enable the team to get on with the tasks of recovery and not spend time trying to work out what their role is in a crisis situation. Each team should have nominated deputies for each role; depending on the size of the organization, it may only be possible to have a deputy for the team leader. In the event the team leader isn't available for whatever reason, a deputy can enable the recovery to start without the leader. It is also good practice to have administrative support, in both the strategic and tactical team, in order both to handle large amounts of information without being overrun by it and to act as an audit point. Decisions will be made on the basis of the information available, and if, in the worst-case events, where staff are injured in the disruption or in the recovery operation, it may be necessary to justify in a court of law why those decisions were made, so audit is vital. Having this information available will help in that, and it will also allow replacements—at the of end of the day or when a process break is taken—to understand what's happened and to assess where the company is in the recovery process.

In incident management, there are three types or levels of recovery teams: strategic (gold), tactical (silver), and operational (bronze). Each team and its responsibilities are as follows.

Strategic (Gold) Team

The strategic (gold) team is made up of very senior management, with the chief executive officer (CEO) or the managing director (MD) at its head. This team must not only keep in mind the nature of the disruption and the recovery efforts that are ongoing but must also keep an eye on the bigger picture: What effect is the disruption having on the image of the company and its market share? The strategic team must determine the policy that will drive the recovery and also how the media are managed. It will have to establish the recovery objectives, not just at ground level, but also how to turn this disruption to their advantage by showing the world and its customers, and those customers of other companies, a successful recovery. These strategies need to be worked out in advance and adapted to the specific disruption that the company is experiencing. A list of areas that this team should be looking at would include the following:

Communications, both internal and external: If the staff do not know what is happening, they will not be able to help; they should be informed in such a way as to ensure they follow what is in their business continuity plan, but also in a way that does not unduly alarm customers and stakeholders. Managing the media is a highly skilled profession; there are many companies where the disruption has being made worse by the CEO saying something he/she should not say on national TV. An agreed statement should be prepared for the press; once the statement is given, no questions should be answered. These holding statements give out limited information to the press and enable recovery staff to run the recovery.

Approving significant expenditures: In any disruption, there may be a need for more resources and people, information technology (IT), buildings, desks, chairs, and so on. It doesn't really matter what it is—there will be a cost involved in acquiring it. A business, any business, only really does one of two things: (1) it makes money or (2) it loses money. In a disruption, not only is there disruption to the customer base, but also the cost of the recovery must be met, unless there is insurance for disruption. If there is insurance, it must be certain that the insurance is effective immediately at the start of the disruption, not 24 hours later.

Monitoring progress: There will be updates from the tactical team chair about how the recovery is going and whether there is anything that needs to be done. For example, does the CEO or MD need to make a statement to the press? Do they need to phone key customers and reassure them that the recovery is on track and that their services or products are being recovered? If the disruption does not affect them at all, it is good practice to inform them so that they are not wondering what is happening and thinking of moving to another business.

Identifying opportunities: As both the tactical and operational teams will be busy running the recovery, it will be up to the strategic team to find other resources that may be needed. This may involve going to different suppliers who may be able to fulfill the company's order book, or deliver a service to one's customers under the company name. These are all strategies that may be needed in the event of a disruption. There is a saying that necessity makes strange bedfellows—the company may have to do business with those who, on a normal day, are competitors.

Financial oversight: In any disruption, the reaction may be to rush to throw money at the problem with the hope that money will solve the problem instead of taking a step back and seeing what the disruption is. It is a fact that money will have to be made available to the recovery team in line with the operational need and the recovery strategy, but good governance where financial payment is involved is a must. The disruption is someone else's opportunity without good governance and financial controls in place.

Legal obligations: Even in a disruption, no matter what the cause may be, all laws must be obeyed. This applies not only to laws concerning the health and welfare of staff but also to any day-to-day laws that govern how the business is run. No disruption or disaster removes the requirement to follow the law. The company does not want to have a successful recovery and find the business or MD being taken to court because they did not comply with the law. This is why it is important to plan and test the plans so these things don't happen. The goals of the strategic team are to look after the long-term future of the business, to release funds to enable the recovery teams to do their jobs, and to reassure staff and customers.

Tactical (Silver) Team

The tactical (silver) team is made up of managers and is led by a senior manager. The job of the tactical team is to manage the recovery and to make sure the business continuity plans that are in place are running and that staff and the business mission-critical activities are being recovered. The tactical team reports to the strategic team on the recovery process and asks for any resources that the operational team has requested. It also monitors and helps coordinate the recovery process and, where necessary, change the recovery priorities depending on how the disruption develops; if it is an ongoing event, there may be a need to revise the priorities of the recovery. In order to do this, the team needs to monitor the information it is receiving both from the recovery teams and all other sources of information, such as the media. The tactical team also needs to monitor the business continuity teams to ensure that they are up and running. The tactical team in effect runs two projects at once, one being the work area recovery (WAR), the other dealing with the effects of the disruption, be it a loss of site or an IT failure. Most decisions that do not involve the board or strategic team will be made by the tactical team. This means that the makeup of this team can change as the disruption develops. At the beginning of the disruption, when there is limited information as to what has happened, managers from IT, human resources (HR), security, and legal may be needed, but as the disruption develops and there is better understanding of the events, then these managers may not have the right skill sets. If, for example, the disruption is the loss of a data center, then at the start input may needed from all of these departments, but as the disruption continues, IT is going to take more of a lead role, as the disruption, after all, is in the domain of the IT department. Even if more input is taken on by other departments, there is still a governance role that the tactical team retains, managing and allocating resources, contacting suppliers, and ensuring that needed supplies are available to the business continuity teams or the operational teams at the site of the disruption.

Operational (Bronze) Teams

The operational (bronze) teams consist of the staff members who are fixing the problem or are the business continuity teams at the WAR site. The goal of strategic and tactical teams is to manage and give the right amount of resources to the operational teams, but always remember that it is this team that is doing the hard work—the others are managing the recovery process, and the operational teams are the ones getting the job done to end the disruption.

Operational teams can be made up of many different staff and skill levels. Some members of the operational team at the site of the disruption may be technical staff from IT or facilities management who know what they need to do to recover a building or data center. They will be working hard to recover a set order of processes and systems that have been worked out beforehand in the company's business impact analysis (BIA). Some of these staff will be at the site of the disruption, and others will be at the work area recovery site ensuring that the business continuity teams have all the support services they need to run the mission-critical activities that will keep the business going in the early stages of the disruption.

Because disruption is out of the normal day-to-day life of most of the staff, these events will put both managers and staff under large amounts of stress; therefore, each team and each person within that team will need a backup. One reason for this is to cover the duties if the appointed manager isn't at work or is on holiday when the disruption happens; a deputy is needed to enable an immediate start to the recovery process. Also, the disruption may last a few days or even weeks, and at some point managers will have to go back to managing their normal departments, and because these events are high stress when they first happen, the tactical and operational teams will need breaks to de-stress, relax, sleep, talk to their families, and recharge. Managers—even very senior managers—can get to the point of burnout very quickly if they do not have breaks. Many managers have had long-term problems after these events because they didn't have or did not take the breaks they were supposed to. In these cases, it is the role of the HR member of the team to ensure the health and welfare of these managers by making them take their breaks.

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See Also: Business Continuity Management; Business Continuity Planning; Business Impact Analysis; Disaster Recovery; Journaling; Minimum Business Continuity Objective; Pre-Impact Planning Process; Preparedness; Recovery Time Objective; Strategic Plans.

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Revolution

This article refers to a revolution as a change in society and should not be confused with a rebellion. There is no unique and single definition of revolution. The term is vague because of the lack of a universal definition. However, most scholars agree that the main factor in all revolutions is a transformation within society from an old system to a new one, sometimes violently, sometimes not. In the typologies of revolution, there are three massive changes identified in human history: agricultural, industrial, and informational revolution. The formation of a revolution develops for many different reasons and through many different approaches. In a similar manner, there are several important factors behind the emergence of revolutions.

A Definition and Discussion of Revolution

The term *revolution* is one of the most controversial issues in academics. Scholars explain revolution in various ways, from a very narrow sense of the word to a very broad one. The term most often describes a society-wide phenomenon called political revolution, such as the French Revolution, the Mexican Revolution, the Iranian Revolution, the Chinese Revolution, the Philippine Revolution, the Nicaraguan Revolution, the Russian Revolution, and most recently the Arab revolutions. In addition, it also describes events like a coup d'état, the agriculture revolution, putsches, a rebellion, a secessionist movement, and other events with important and significant changes. Until recently—that is, in the last few centuries— the term *revolution* generally referred to political phenomena. The social sciences now include the agricultural revolution, industrial revolution, information revolution (sometimes incorrectly referred to as the computer or technological revolution), and others that are not based on changes to the current political regime. Any event that significantly alters how we live our lives on a societal or global level is a revolution. Therefore, it is difficult to settle on one unique definition of revolution.

The term *revolution* has become a household word describing important events in human life. A revolution can be defined as a sudden, radical, drastic, massive change in the social or political structure of a given society. That is, regarding the establishment of a new system, it is a required transformation from the old to the new system. Examined systems can include social institutions, interest groups, environmental approaches, political and social structures, economic models, socioeconomic situations, social relationships, or ideological features. Revolution can result in a complete change or a modification of an existing system.

AMERIC UNIVERSI

Demonstrators give speeches, chant slogans, call for prayers, read poems, and play songs on the "broadcast of the revolution" stage in Tahrir Square, Cairo, Egypt, in February during the 2011 Arab Revolution, also called the Arab Spring.

A good picture of any form of revolution has been seen recently in the Arabic world. The civil unrest in some Arabic countries is known as the Arab Spring or the Arab Revolution. The revolutionary wave has occurred in several Arabic countries, including Tunisia, Egypt, Bahrain, Yemen, Syria, and Libya. This civil unrest has also influenced several other countries in the Arab world. The Arab Revolution can be categorized as a type of political revolution, which primarily refers to any significant or extensive change regarding political rules or systems; they have occurred often through human history.

The sociological perspective defines revolution as a social change in the structure of society. Auguste Comte rejected the idea of revolution in respect to changing social structures. He claimed that minor changes in the structure of society occur all the time but that social order was necessary for society to remain whole, else the structure of society would break down and the social changes would be meaningless. Thus, a new government that kept the same social and political structure would be considered a minor social change. Minor social changes come and go but eventually build into a major social change. In contrast, Karl Marx defined revolution as not simply a case of rebellion but also the result from struggles in class conflict. Class conflict results from a fight over resources, and that struggle leads to revolution. Finally, German sociologist Max Weber perceived revolution as a form of nonlegitimate social change. This is a change in the structure of society that transforms it, changing not only how people govern themselves but also how they interact at all levels of society. The perspectives of all three sociologists agree on the concept that a revolution is a substantive change in how society operates based on changes to the social structure. The change itself may appear to be heralded in quickly through political struggle and upheaval, yet it can also develop over decades or even centuries as the newer structure takes over from the older structure.

Typologies of Revolutions

There are several types of revolution existing in scientific literature, yet there are no entirely inclusive typologies among scholars. These typologies are formed based on examining varying concepts and approaches. Academics studying fundamental changes within societies throughout history have found three massive typologies of revolutions: agricultural, industrial, and informational. Each revolution increases society's ability to support a larger and more complex society, thereby replacing the previous society and rendering it outdated. Finally, each approach is dependent on the concept that with the passage of time, this new way of life will take over from the old and society will be changed as a result: agricultural over hunter/gatherer, industrial over agricultural, and informational over industrial.

Alternatively, Patrick Van Inwegen outlined revolutions based on intensity, speed, and scope as characteristics determining their type. Accordingly, there are five types of revolution: social revolution, political revolution, revolution from above, democratic/negotiated revolution, and velvet revolution. Only one thing is certain about all of the varying definitions and approaches in typologies—they all overlap.

Cause of Revolution

The causes of revolutions vary as well. Many significant factors operate in many varied ways to lead toward revolutions and to foster their progress. For instance, Marx considered that class led to emerging social revolutions. Alexis de Tocqueville perceived that the demands of economic and social progress tended to build momentum toward revolutions. For example, several factors behind the revolutionary wave in the Arabic world are reactions to poverty, corruption, dictatorship, demographic structure, absolute monarchy, cultural differences, and violations of human rights. Overall, a huge amount of literature includes the following as causes of revolution: famine, economic change, class struggle, enlightenment (such as the Age of Enlightenment), ideology, natural disaster, corruption, the structure of society, politics, and the varied means of production.

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See Also: Civil War; Political and Organizational Leadership; Protest; Religious Violence; Riots; Strikes.

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Riots

Riots have been a feature of countries throughout the world since history began. There are, of course, legal definitions for riot, but they are more appropriate to criminal prosecutions than to providing a working definition. Riots are generally regarded as occurring when large numbers of people are involved in violence, over a considerable period, that includes breaking into premises (including in some cases setting fire to them), looting, and attacks on law enforcement officers. In the United States, a riot is likely to result in the deployment of the National Guard and other federal forces in addition to the normal law enforcement agencies of the area in which it takes place. Elsewhere, it will involve the deployment of either a third force, such as the Compagnies Republicaines de Securite (CRS) in France, or, as in the United Kingdom, squads of law enforcement officers who have received specialist training in handling riots.

The causes of riots are many and varied but can broadly be divided into eight categories. They can occur as follows:

1. During protest meetings or processions where people are demanding economic (including that associated with food shortages), social, or political reform, or protesting against actions either proposed or taken by their own government, or protesting against the actions of a foreign regime, for example, Seattle in 1999.
2. In prisons when those incarcerated are either protesting about the conditions in which they are detained or because they have some other kind of grievance against the prison regime, for example, the Apodaca prison riot in Mexico in 2012.
3. During industrial disputes where employees are in dispute with their employer(s), or some employees are working while others are on strike, or employees, having gone on strike, have been permanently replaced by others.
4. At political meetings or processions where one group of people is opposed by a group with contrary views, such as fascists and antifascists, for example, those that occurred in the United Kingdom in the 1930s and 1970s, and Germany, particularly since reunification.
5. As a result of disorder where a section of the community confronts the forces of law and order, often referred to as "urban riots," for example, Los Angeles in 1992.
6. During what is commonly referred to as "race riots," in which people from one or more of the ethnic communities are

confronted by a section of the indigenous population, for example, Notting Hill, London in 1958, and those that swept the United States between 1963 and 1967.

7. As a result of clashes during which people of one religious persuasion are confronted by those of another religious persuasion, for example, Gujarat, India, in 2002.
8. In association with sporting events where groups of supporters from opposing teams confront each other, for example, Brussels in 1985, or go on a rampage after their team has lost an important game or, on some occasions, won an important game, for example, Vancouver, Canada, in 2011.

Riots in countries that tend to be ruled by dictators are often brutally put down by law enforcement agencies and sometimes the military. In a liberal democracy, however, there tend to be a number of principles that the law enforcement agencies ignore at their peril. Preventive deployment, that is, the deployment of law enforcement officers in such a way that it stops large crowds from assembling, was introduced in the United Kingdom in the early years following the formation of the Metropolitan Police in London in 1829, when dealing with the Ultra-Radicals and the Chartists. In those early years, the police quickly learned that the wisest use of manpower was always to prevent violence from breaking out, rather than to suppress it after it had done so.

The concept of minimum force, which suggests that, in responding to riots, any force used to control and disperse the rioters must be reasonable and not excessive, has been a general principle of policing for over two centuries. But there is no legal definition of "reasonable force," and the problem for law enforcement officers is that decisions will be made on what is reasonable in the cold light of day by people sitting in judgment. However, when the violence displayed by the rioters involves attacks on people, including law enforcement officers, and is accompanied by the throwing of missiles, including petrol bombs, and the firing of weapons, then the "reasonable force" used in the response will be considerable. In order to curb rioting, law enforcement agencies generally use a gradation of force, which can include bodily pressure, mounted officers, police dogs, the use of batons, various types of personal protective equipment (including shields and special helmets), vehicles including water cannons, baton rounds, CS gas and pepper spray, and finally, if lives are in danger, lethal force. Virtually every outbreak of rioting has been accompanied by accusations that law enforcement agencies resorted to a level of violence that went beyond the concept of minimum force.

The third principle is consent and balance. In liberal democracies, governments do not have at their disposal sufficient force to coerce their citizens into accepting laws and policies that a minority of them actively oppose. It follows that if law enforcement agencies are to carry out their duties effectively, they need the broad consent of the communities in which they operate. Consent and balance will not be achieved if the police are seen to be influenced or controlled by a national or local government, to the detriment of the community as a whole.

The principles are interrelated. For instance, if law enforcement agencies use excessive force, they are unlikely to enjoy the consent of the

Case Studies in Modern-Day Riots

The starting point for the study of modern-day riots in the United States is the early 1960s, culminating in the summer of 1967, when, during the first nine months, serious rioting occurred in eight different jurisdictions and civil disorder was recorded on between 51 and 217 occasions, depending on the definition of civil disorder used. This resulted in the president setting up the National Advisory Commission on Civil Disorders. In the United Kingdom, the starting point is probably 1981, when there was rioting, first in Brixton, London, in April, followed by disorder in a number of Britain's major cities in the summer. This led to the appointment of an eminent judge, Lord Scarman, to inquire into the outbreak of disorder in Brixton. Since then, there have been separate occasions when riots have broken out in cities across the United States, including Los Angeles in 1992. England underwent four days of rioting, again in a number of its major cities, in August 2011.

community. Similarly, if they merely react to events as they occur without making any attempt to prevent them from happening in the first place, they are more likely to become involved in using force that is seen by some to be excessive.

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See Also: Command and Control; Operational Plans; Operational Readiness; Peacekeeping; Perimeter Control; Protest; Religious Violence; Revolution; Strikes.

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Risk Analysis

Risk analysis is a crisis management tool that improves understanding of potential ramifications of risks that can lead to crisis situations and decision making about successfully reducing these risks. Relevant data and information for a specified analysis objective and scope are identified and systematized through synchronic analysis of the combined potential dynamic effects of underlying hazards, exposure, and vulnerability. Issues for consideration include the appropriate level of quantitative and qualitative data, of participation and aggregation, and of realized and anticipated loss of data.

Though it is sometimes considered a subcomponent of risk assessment and sometimes a separate component in the risk management process, the resulting systematized outputs enable risk evaluation to determine which risks are to be minimized through treatment measures and which residual risks will remain for risk transfer or crisis preparedness and response.

Risk analysis can also be conducted in areas currently in a crisis situation to help determine how to address risks faced in the crisis and from actions taken to resolve it. Although such corrective risk analyses can be especially relevant in conditions of protracted crisis from extensive risks, the following introduction focuses on prospective risk analyses for proactively understanding realized and unrealized consequences of changing intensive and extensive risks. Although it is based on approaches for disaster risk reduction for a geographical entity, the approach is applicable to analyses related to crises arising from vulnerability to all types of hazards for any type of organization.

Methodological Framework

Though steps and terminology in approaches lack uniformity, all risk analyses determine scope and objectives of analysis, technical characteristics of objective-relevant potential hazards, and expected effects from interaction of resulting hazard scenarios with objective-relevant exposure, vulnerability, and capacities of elements of the system being analyzed. Since outputs of risk analysis are inputs to risk evaluation, appropriate methodologies are determined according to the purposes of evaluation for the specific system scale under investigation and the complexity of information desired by decision makers. These objectives and scope can range from enabling evaluation by an individual of expected loss of one element of one process in one function for him/herself to doing so for all elements, processes, and functions of an organization, nation, or region or for comparison across systems or times. Overall assessment objectives and risk management objectives of decision makers must also be considered. Generally, from analyses focusing entirely on quantifying expected loss of physical elements at risk to holistic analyses of expected losses and improved practice for all environmental, physical, economic, and social elements at risk and the processes that combine them into resulting functions at risk, objectives and resultant methodologies are based on systematization of data regarding who or what is vulnerable to what hazards and exposure and with respect to what basis for evaluation.

For the chosen scope and objectives, biophysical analysis and socioeconomic analysis allow for integrated analysis of interactions between hazards and underlying exposure and vulnerability of relevant system elements. Biophysical analysis focuses on hazards and hazard-dependent environmental and physical exposure that is covariate across subsystem parts spatially. After initial identification of hazard types and available data for the area, specific methodologies involving appropriate specialists and instruments are determined because of the differences in causes of different hazard types on impacts on different element types. These methodologies are then used for objective-appropriate spatial analysis identification and characterization of hazard-prone locations and exposed elements in them; dimensional analysis calculation of causes and probabilities of occurrence and the scale, scope, intensity, and impact chains of potential hazard events; temporal

Case Study 1: Central American Probabilistic Risk Assessment

Although the Central American Probabilistic Risk Assessment (CAPRA) methodology can provide different types of users with tools, capabilities, information, and data to evaluate disaster risk through probabilistic analysis, its main objective is providing probabilities and estimates of potential future risks at a national level. After statistical summarization of historical hazard intensities and frequencies into stochastic scenarios for locations across the country and estimation of exposure values of assets at risk, vulnerability curves quantify potential damage to each asset class according to hazard scenarios based on specified vulnerability functions. Economic losses from multiplication of this damage figure by the value at risk are calculated for each asset class at each location and are aggregated. Resulting measures such as loss exceedance curves, probable maximum loss estimates, and aggregated average annual loss can be used by decision makers to compare and aggregate expected losses from various hazards in current and future scenarios.

In such quantitative analyses at a macro scale, scientists outside the system derive probabilities and risk estimates independently based upon their own subjective understanding of relationships. Alternatively, for risk analysis projects focused on in-depth understanding of risks particular to a system or subsystem that are dependent upon understanding the specific socioeconomic, environmental, and spatial context of vulnerabilities, deterministic qualitative profiling of the relationships between system subcomponents is useful. Quantitative and qualitative participatory methodologies have been developed to additionally capture the subjective sociocultural values and risk perceptions of different affected stakeholder groups, beliefs, and changes influencing those perceptions, as well as local factors shaping vulnerability. As both perceptions and types of data can be relevant, innovative community-based approaches to measuring risk that combine multiple physical hazards, perceptions from local and outside expertise, and qualitative and quantitative approaches to understanding social vulnerability have helped improve local analysis while developing processes for evolving risk knowledge and improving capacity for self-analysis. As the scale of study increases, however, such detailed information from the micro level must be simplified and aggregated through quantified indicators and proxies in order to be useful for evaluation. Related challenges for improving analysis include balancing methods for more integrated interdisciplinary approaches that link macro indexing with micro-participatory context-specific analysis, allow continuous monitoring, and acknowledge which aspects of hazards, exposure, and vulnerability can and cannot be quantified in the studied context. Case Study 2 provides an example utilizing participatory selection of criteria for analysis, quantification of direct physical vulnerability, and then qualitative approaches to understand how perturbations from the baseline living situation affect different community subgroups.

analysis identification of effects of factors influencing and modifying hazards and physical exposure dynamically; and resulting scenarios, often including maps, incorporating relevant data and information for socioeconomic analysis.

Socioeconomic analysis focuses on vulnerability and hazard-independent exposure that is idiosyncratic within subsystem parts from environmental, physical, economic, and social processes resulting in susceptibility to perturbations and capacities to withstand, avoid, neutralize, and absorb impacts. Based on objective-relevant hazard scenarios and other outputs of biophysical analysis, steps include identification of potentially

Case Study 2: Local Participatory Risk Analysis

In nine islands of the Maldives scheduled to receive migrants from other islands, a risk analysis process was developed to bridge inside and outside stakeholders and biophysical and social-economic vulnerabilities in response to potential crises from environmental hazards and associated vulnerabilities. The three-step analysis addresses understanding vulnerable subgroups' perceptions of how effectively underlying institutions, processes, and elements of each basic societal function (BSF) would operate through changes from baseline to an adverse event to a potential future situation.

Step one involves physical scientists, engineers, planners, local key informants, and household focus groups pooling information to create likely impact scenarios for the baseline current condition, a likely adverse hazard event, and under a likely combination of future physical trends in investment, population, climatic conditions, and hazardous events on the islands.

Step two involves local government leaders and key community informants defining two significantly representative subgroups deemed least able to access the BSFs and most vulnerable under normal year, disaster risk, and future scenarios. A socioeconomic vulnerability team then works with these focus groups to identify the baseline current condition of economic and social elements and processes of the BSFs. Likely effects of coping, buffering, and adaptive capacities are elicited through discussion of potential impacts under the physical adverse event scenario and the physical future scenario. From these results, the highest-priority risk reduction elements are identified.

Finally, step three involves sharing similarities and differences from group perceptions under each scenario so that different stakeholder groups can iteratively study, discuss, and revise perceptions until agreed-upon knowledge of final risk levels for evaluation results.

This example also exemplifies incorporating dynamic risk elements. Retrospective analysis of realized losses from previous events can guide investigation of baseline and emerging vulnerabilities for general populations and system subgroups but can be unreliable for estimating future vulnerabilities, especially for low-frequency hazards and areas undergoing significant socioeconomic and environmental changes. Studying systems expecting significant modification from development, population, creeping environmental problems, wealth, local resilience, or other changes requires prospective analysis of processes causing changes in types of hazards or probabilities of their occurrence, spatial and temporal processes by which system subcomponents are exposed and vulnerable to potentially damaging events, and effects of socially differentiated adaptive capacity status and limits on resilience of subsystem components. Such analyses aim to consider historical information along with anticipated future risk scenarios based on improved spatially detailed population, economic development, poverty, conflict, corruption, response, and scale-appropriate climate change migration, adaptation, and future hazard effect scenarios. Developing methodologies to bridge sophistication in quantitative, qualitative, participatory, aggregation, historical, and prospective methods in ways appropriately simple and implementable for specified objectives and scopes remains a challenge.

vulnerable elements; identification and analysis of factors affecting environmental, physical, economic, and social vulnerability for these elements; development and utilization of a system for quantitative and/or qualitative characterization of degrees of element vulnerability; analysis of potential effects of preparedness, adaptive, buffering, and coping capacities on these vulnerabilities; and systematization of these data and information as appropriate for evaluation.

Methodological Issues

Recent technologies for remote sensing and GIS have improved mapping and analysis of covariate spatial aspects of physical vulnerability, but integration of social, economic, and environmental vulnerability in socioeconomic analysis remains a challenge because of their idiosyncratic nature within systems. Determination of appropriate levels of quantitative and qualitative data relevant for this analysis is a methodological challenge. Risk analysis in crisis management has historically utilized traditional quantitative probabilistic techniques of identifying uncertainties of events according to probability of occurrence and severity of impact despite insufficient data for fully understanding hazard effects in the analyzed system's context. Additionally, for risk analysis projects comparing risk across systems or time, differing or changing location-specific institutions and processes in different systems can render resulting indicators useless for comparison. But quantitative analysis can help capture hazard-dependent physical exposure based on experienced losses and some hazard-independent vulnerability conditions of socioecological fragility or lack of resilience. As exemplified in Case Study 1, innovative approaches to producing probabilistic loss results for specific hazard scenarios and local vulnerabilities can provide useful statistics on potential asset losses.

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See Also: Business Impact Analysis; Damage Assessment; Disaster Risk Reduction; Hazard, Definition of; Hazard Vulnerability Analysis; Impact Analysis; Losses, Quantitative Versus Qualitative; Methods, Quantitative; Risk Assessment; Scenario Planning; Uncertainty; Vulnerability; Vulnerable Populations.

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Risk Assessment

Risk assessments are a step in the risk management process. A risk assessment is the quantitative or qualitative determination of risk related to a situation and a related credible hazard, or threat. Risk assessments that are quantitative incorporate calculations of two components of risk (R). These are the magnitude of the potential loss (L) and the probability (P) the specific loss will happen.

$$\text{Risk (R)} = \text{Potential Loss (L)} \times \text{Probability of Loss (P)}$$

Risk assessments are commonplace in numerous industries. This includes within the safety industry, particularly when there are concerns of threats to life, our environment, or equipment and processes malfunctioning. Other areas where risk assessment is prevalent include aviation, nuclear energy, mining, oil/gas, engineering, health, and disaster management planning. These industries have incorporated risk assessment into their daily activities for a number of years. The overall risk assessment methods may differ between industries and are often dependent on exposures and the vulnerabilities of the exposed, including environmental, ecological, and public health. However, there are numerous commonalities to the approach used in risk assessments. Some of the common steps are outlined herein.

Step 1: Gathering Information

One of the first steps in the risk assessment process is gathering pertinent information with regard to the assessment. For instance, for assessing risk at a museum that may be prone to various types of disasters, it may be important to understand information related to the museum's collections, including the significance and vulnerabilities of these. Some of the pertinent information for further understanding the overall context may include that related to the following:

- Overall environment (for example, business, regulatory, cultural, social, financial)
- Corporate culture and corporate structure
- Stakeholders
- Resources (people, processes, systems, capital)
- Characteristics of the site and structure
- Characteristics of the occupant
- Collections and their significance/vulnerabilities
- Operational/functional characteristics
- Background/intention of the disaster management plan and schedule

Step 2: Identifying Goals and Objectives

Goals are typically noncontroversial statements reflecting a common aim. They are measured qualitatively and can come in many forms depending on what the risk assessment is for. Oftentimes in crisis management, risk assessments are used to help further understand impacts on people, property, business interruption, the environment, and cultural heritage. Goals for this may therefore include the following:

- Life safety (occupants, emergency responders)
- Protection of:
    - » Contents, artwork, artifacts, and historic fabric
    - » Building
    - » Spirit of place/traditions
    - » Business continuity
    - » The environment

One's goals may also address how risk mitigation measures are implemented. Using a museum, library, or cultural heritage property as an example, some of the goals to be incorporated into the risk assessment may include these:

- Limiting the impact on historic fabric/limit visibility and impact on aesthetics
- Effective and integrated mitigation solutions
- Incorporating sustainability goals
- Limiting impact on functionality of the space

Goals can also be specific to the area of the world or region upon where the study is taking place. Goals may not be the same everywhere, or for everyone. For instance, goals for a single building may vary for the site, the structure, front of house/public areas, back of house areas, high value/significant collection areas, workshop areas, storage areas, and other areas and spaces throughout.

Competing goals may be a challenge and reason to proceed with caution. These, for example, may arise when addressing security and life safety and where attention is needed in allowing people to freely evacuate during an event, while keeping others from getting into the building otherwise.

It is also important to understand vulnerabilities. This will help in identifying the level of risk and whether it is acceptable or whether additional mitigation measures may need to be provided. This should be determined early on to help develop the goals/objectives and to identify what needs to be protected and to what level. This will also help in the next step of establishing what the performance criteria should be, based on the hazard.

In defining goals, a further understanding can be gained while developing detailed mitigation strategies and protecting the various exposures appropriately, as well as determining with more confidence whether the proposed risk mitigation results may achieve the desired goals.

The objectives are then used to provide more specific direction as to how a goal might be achieved. Objectives are normally stated in quantifiable terms. These are then transformed into quantitative performance criteria.

Step 3: Performance Criteria Development

The "metrics" against which the above goals and objectives are assessed in a risk assessment are often termed "performance criteria." These are stated in a manner that can be directly measured or calculated. For instance, in the nuclear industry these may be stated in terms of radiation released; or in disaster management, performance criteria may be defined as highest flood level, magnitude of an earthquake, highest/lowest temperature/humidity, or smoke temperature. These become the criteria against which mitigation measures will be assessed when exposed to the various hazards.

Step 4: Hazard Scenario Development

There is an infinite number of possible hazard scenarios that could exist, depending on the subject of the risk assessment. Hazard and risk assessment techniques are therefore often used to help reduce the universe of "possible" scenarios to "credible" scenarios and those more of primary concern and probability. In looking at museums as an example again, some researchers have divided these hazard scenarios into agents of deterioration that can help identify credible hazards. Statistics can also be used.

After reducing the universe of possible scenarios to a smaller subset of scenarios, the characteristics of these scenarios then need to be established. Regarding fires, for example, these characteristics form the more detailed basis of design fire scenarios. Some of the common characteristics of a fire scenario include ignition, growth, peak heat release rate, steady burning period, decay, and extinguishment.

Step 5: Developing Mitigation Options

Once hazard scenarios are developed, then it is important to develop options to address them. These scenarios can include accepting risk, mitigating risk, or transferring risk. For disaster mitigation, for instance, these options may involve all of these in part. For example, some of the risk may be accepted, while mitigation measures may be developed and implemented prior to the credible event, or implemented during the event and/or the recovery phase to address other risk, while others may be managed by the transference of risk, such as to an insurer. There are numerous options, therefore, that may be available, but it is important to understand one's goals and undertake appropriate risk assessments to help stakeholders make more informed decisions as to the mitigation options to achieve these goals. One may also need to weigh the mitigation measures against the impact these can have on mitigating the event, their costs, and resources to determine what needs to be done. In light of this, a cost-benefit analysis may assist.

Step 6: Options and Mitigation Measures

Following the identification of mitigation options, the next step is to assess these as to their ability to address the previously established goals and performance criteria. This can include qualitative or quantitative assessments of the probabilities of these events occurring, as well as analyses as to the potential losses that may occur. It is important to understand that during the risk assessment process, one may not have all of the data needed and that assumptions will need to be made. Within this step are various studies that should be undertaken to also look at the variability and sensitivity of these assumptions and the impact they may have on the outcome of the assessment.

There are several different types of methods and tools available to calculate or analyze these. These analyses can range from "back of the envelope" equations to complex computational modeling, to assessing past events and history, to detailed probabilistic studies that may include fault trees, event trees, HAZOPS, and other similar types of analyses.

If these alternatives are shown to be able to meet the performance criteria, then they can be selected as ones suitable for final design. The evaluation process is an iterative one. There may be several mitigation alternatives to be evaluated against the various events that may occur and one's objectives. Once the analysis has been done, then stakeholders can make appropriate, risk-informed decisions.

Step 7: Risk Assessment Documentation

The final step in the process is documenting the overall risk assessment. This helps all of the stakeholders understand the basis of the risk assessment and captures it for the future. Risk assessments are typically objective. As noted, they typically incorporate various assumptions to help further understand the risk. Because of this, uncertainties and variability of these assumptions should be taken into account in the risk assessment and clearly documented. Use of appropriate metrics is important, as results of a risk assessment may be expressed differently. For example, in financial-related assessments, such as for insurance, one uses currency to express the magnitude of loss. When risk assessment is used for public health, loss may be in terms of loss of life or a quality of life.

When undertaking risk assessments, one should also note that given the same level of risk, various risks and hazards may be mitigated differently. For instance, a scenario with a large probability of loss and a low probability of occurring may be treated differently from the scenario with a low loss potential, yet with a high probability of happening. From a theoretical standpoint, these scenarios may both be of approximately equal risk; however, they may be treated quite differently. This should be addressed appropriately in the documentation as well.

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See Also: Fires; Prevention; Risk Analysis.

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Risk Society

Modern times are characterized by complex relationships and networks, since the spheres of private and business life are determined by various grids and lattices creating the relations and dependencies among human beings and other entities. This complexity shapes the organizations of the 21st century, since they must cooperate with diversified workers and stakeholders and simultaneously possess the necessary financial and social capital to respond effectively to the dynamic business environment. Consequently, the mentioned multifactoral and multilevel organizations, as well as their workers and stakeholders, are exposed to risk factors at both internal and external levels.

However, risk did not appear only in the 21st century—it has existed in human life since time immemorial. In premodern times, risks were connected with diseases, wars, and weather-related catastrophes. With the development of civilization, the catalog of risks started to undergo many changes. The risks that could be controlled by human beings have been substituted with the ones related to technological development. The origin of the term *risk* goes back to the 16th and 17th centuries, to the times of Western explorers. Originally, it referred to sailing in unknown waters. Later, its meaning was extended to denote various forms of uncertainty.

There are many approaches to the issue of risk society. For example, risk society can be understood as the society absorbed with a future that creates risks. Another approach is to view risk society as the society that deals with the hazards of modernization. It should be stressed, however, that risk society is not more dangerous or hazardous than other forms of society that have existed before. What is different in the 21st century in comparison with previous epochs is the individual's consciousness about various risks and their consequences. Apart from the mentioned term *risk society*, some researchers opt for the term *risk culture*. The reason for the selection is the scope of meaning the term encompasses. Risk society denotes a determinate, rule-governed, and hierarchical group of individuals, whereas risk culture is indeterminate and noninstitutional. Risk society concentrates on norms and rules, whereas risk culture pays attention to values.

Characteristics of Risk and Risk Society

As far as the characteristics of risks are concerned, risks have mainly two components: the destructive consequences that are already visible and the ones that may occur in the future. Thus, risks include both the present situation and the future prediction. Moreover, risks are not exclusively connected with one particular phenomenon or entity, but they create the domino effect or the boomerang effect since they generate risks in several related domains and entail those people and entities not directly involved in risky activities.

Risks enhance both positive and negative actions and behaviors. Taking the detrimental side of risks into account, they often describe hazardous behaviors or are associated with such emotions as fear or fright. Risks also can be linked with positive aspects, such as the need to be attentive or eager to accept and implement necessary changes. Additionally, risks may stimulate making courageous decisions or creating innovative ideas. Looking at the positive side of risks from a more individual level, some people need risk in their daily activities because the adrenaline gives them the necessary power to fight with everyday issues or enables them to relax after demanding duties. Risks also give individuals the opportunity to test themselves, both physically and psychologically, in new and even crisis situations.

Taking the feature of group cohesion into account, risks can serve both integrating and disintegrating functions. They make the group united in the face of difficulty and enhance mutual cooperation, but at the same time they create antagonisms and conflicts. As far as the methodological level of analyzing risk society is concerned, risk is usually associated with the spheres of life that involve some change or danger, such as economics, health, sports, and transportation. However, applying the postmodern perspective, picturing the society as the one with no clear-cut boundaries, risks are a part of everyday life because of the mentioned interrelation of domains and activities.

Influence of Technology

As has been mentioned above, risk is caused and accelerated by the characteristics of modern times. One of the factors shaping risk societies is technology. However, the relation between technology and risks is mutual and dynamic, since risks also determine technological performance. Technology enhances the appearance of risks, since new technological devices create risky situations. An example of this influence can be the threat to privacy in online social media. At the same time, technology offers the possibility of quick knowledge diffusion and information saturation and, consequently, gives the individual the possibility to respond to risks in an active and effective way. Moreover, knowledge and technology give the person the option to turn incalculable risks into calculable risks.

Classification of Risks

As far as the classification of risks is concerned, they can be also divided into external risks and manufactured risks. External risks are the ones that happen unexpectedly in regular intervals, and their appearance can be predicted and insured. On the other hand, manufactured risks, being the result of rapid human development at the scientific and technological level, cannot be predicted and insured, mainly because of the novelty of domains and entities they appear in. Risks also can be divided into individual and group risks. Thus, the number of risks one is exposed to depends on several individual and group factors. Although some risks are connected with low social position, there are also certain risks (e.g., the ecological ones) that concern everyone regardless of his or her financial situation. Moreover, individuals have different levels of risk acceptance that depend on several cultural, personal, and situational features.

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See Also: Bounded Rationality; Cognitive Novelty, Engaging; Crisis, Definition of; Disaster, Definition of; Risk; Social Distancing; Social Media.

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Risk Treatment

Risk treatment is the process of identification, selection, and implementation of appropriate measures aiming to modify the likelihood of occurrence or the impact of a risk. This process follows the stages of risk identification and assessment in the risk management cycle.

Identification of Risk Treatment Options

Identified risks may have varying impacts on an organization, because not all risks are downside (negative) risks carrying the prospect of loss or damage. The risk identification and assessment process may also reveal substantial rewards arising from taking certain risks, known as upside (positive) risks. In general, the risk treatment options available to the management of an organization fall into four broad categories: avoidance, mitigation, acceptance, and transfer (AMAT).

Risk avoidance: At times, an organization may wish to avoid some risks with high likelihood and/or potentially devastating impact, because the expected rewards may not justify the costs of implementing any other treatment options, or because some risks can only be treated by terminating the activities likely to generate them. For example, one may decide not to buy a property or take over a business in order to avoid the risk of unwittingly taking on any legal liabilities that might come with it, or choose not to travel by plane in order to avoid the risk of the plane being hijacked. However, sometimes the organization may not be able to avoid or eliminate the whole risk, so the organization will need to consider the implementation of control measures to address any remaining risk. It is also vital to note that avoiding a risk might increase the severity of other risks and possibly result in failure to exploit any potential rewards.

Risk mitigation: The purpose of risk mitigation is to reduce the level of risk exposure to a comfort zone for the organization, while continuing with the activity that is giving rise to the risk. This comfort zone must be defined before embarking on any mitigation strategy, since it forms the target against which the effectiveness of mitigation can be measured. Risk mitigation can be achieved by reducing either the likelihood of risk occurring or the impact of risk occurring or both. For example, there is a risk of objects falling at a construction site. The likelihood of objects falling can be reduced by ensuring that the safer working practice is adhered to at all times, while the impact of objects falling can be mitigated by the compulsory wearing of protective helmets.

There are two types of risk mitigation strategies: proactive and reactive. Strategies that seek to reduce the likelihood of risk occurring are proactive, whereas those aiming to reduce the impact of risk occurring are reactive. Proactive strategies involve preventive maintenance, audit and compliance programs, enhanced supervision, contract conditions, policies and procedures, equipment testing, exercising of emergency plans, investment and portfolio management, staff training, technical controls, and quality assurance programs. These strategies may also result in total risk avoidance if the likelihood of risk occurring is reduced to zero. On the other hand, where it is not possible to reduce the likelihood of a risk occurring, reactive strategies need to be in place to lessen potential damage or loss from the risk. Early action that is taken to protect against the worst effects of a risk can often make the risk more acceptable if it occurs. Contingency planning, disaster recovery and business continuity plans, off-site backup, public relations, and staff training on emergency procedures are examples of reactive strategies, as they are measures that help organizations resume their business activities after the realization of risk events that they have little or no ability to control.

Risk acceptance: Risk acceptance, also known as risk "tolerance" or "retention," is the informed decision to accept the risk (based on the results of risk analysis and risk evaluation) and assumption of full responsibility for this decision and any subsequent consequences.

For some risks, risk acceptance may be appropriate, because the current risk exposure is within the organization's risk appetite and the cost of taking any other treatment action is disproportionate to the potential reward. There may also be risks to which exposure is beyond the organization's risk appetite; however, they still need to be accepted because of the organization's limited ability to deal with them or because these risks present extremely profitable opportunities or relate to a process that is fundamental to the nature of the organization. Deepwater drilling in the Arctic Ocean is an example of such risk, that oil and gas companies are willing to accept, although only for the development off Alaska's Arctic coast; U.S. government authorities project the risk of a major spill at about 30–50 percent, and that a worst-case blowout could release some 1.3 million barrels (58 million gallons) of oil. It is forecast that a major spill will travel with currents, in and under sea ice during ice season, and it will be virtually impossible to contain or to recover. Even with robust oil spill response capability, in most scenarios far less than 10 percent will be recovered. Nevertheless, more and more companies (and governments) are ready to accept this risk.

A volunteer is covered from head to toe in protective clothing and gear as she guts the kitchen of a flooded home in Bayboro, North Carolina, October 21, 2011. Taking protective measures is part of risk mitigation, which is one category of risk treatment.

Risk acceptance should always be backed up by contingency strategies such as the development of a risk-aware culture; incorporation of risk management into routine project processes, with regular risk reviews, reports, and updates; and taking account of identified risk with agreed responses that will help the organization to cope with the uncertainty that this risk acceptance may cause.

Risk transfer: Risk transfer, also called risk financing, is another risk treatment option that aims at having another party bear or share some part of the risk through contracts, insurance, outsourcing, joint ventures, or partnerships. Although this option seems attractive to most organizations and it is even argued as the best choice among all risk treatment options, the use of risk transfer is mainly limited to financial risk exposure. Risk experts argue that the reason for this is that although it is possible to be compensated by another party in the event of a risk occurring, it is difficult to enhance performance shortfalls by transferring the risk, and it is certainly not possible to recover the lost time. Also, it is important to recognize that not all risks are transferable (for example, reputational risks). In this case, organizations may consider a "risk budget" allocated against specific risks, with its size determined by the impact of the risk and agreed release conditions defining when the contingency amount should become available for use. Another way of addressing these risks is through self-insurance or the use of captives (owned or rented).

Risk transfer almost always involves a "risk premium" that needs to be paid, and it is important that the costs of transfer must be at least balanced by the benefits to be received, or it is not worth transferring the risks. Furthermore, it is also important to note that risk transfer does not eliminate or remove the risk; rather, it gives the ownership and liability to another party. It is therefore essential to ensure that the recipients of transferred risks are capable of managing the particular risks given to them.

Selection of Risk Treatment Options

Selecting the most appropriate risk treatment options involves balancing the costs and efforts of implementation against the benefits derived, with regard to legal, regulatory, and other requirements such as social responsibility. An organization may consider and adopt more than one risk treatment option either separately or in combination. An example is the effective use of support contracts and specific risk reduction strategies followed by appropriate insurance and other means of risk transfer.

The decision about the appropriate risk treatment option should first consider the risk as "gross risk" (i.e., the risk level before any risk reduction measures have been implemented), compare this against the cumulative rewards of the situation, and then introduce a third dimension, which is the controllability of the risk.

Consequently, for a low-level gross risk with low rewards and low controllability, the organization should select the "risk acceptance" option, whereas for a high-level risk with low controllability and low rewards, it should opt for "risk avoidance." Risks with high controllability lend themselves to "risk mitigation" options, and risks of low controllability and high rewards are more appropriate for "risk transfer."

Another important criterion for the selection of risk treatment is the comparison of the treatment cost with the benefits obtained or expected. During this process of cost-benefit judgments, it is important to consider all direct and indirect costs and benefits, whether tangible or intangible, and measured in financial or other terms.

Implementation of Risk Treatment Options

Once the appropriate risk treatment option is selected, a risk treatment plan should document how the chosen treatment option will be implemented. The information to be documented in the risk treatment plan should consist of the following:

- The reasons for selection of treatment options, including expected benefits to be gained
- The persons accountable for approving and implementing the plan
- Proposed actions
- Resource requirements
- Performance measures and constraints
- Reporting and monitoring requirements
- Timing and schedule

The completed risk treatment plan should be integrated in the risk management processes of the organization and be discussed with the appropriate stakeholders.

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See Also: Hazard Mitigation; Risk Analysis; Risk Assessment; Stakeholders.

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Routine Emergencies Versus True Crises

Routine emergencies are incidents that threaten life, health, property, or the environment and require remedial actions to prevent further damage. Emergencies develop quickly and have tangible effects that must be remedied to minimize harm. Emergency service personnel plan, prepare, and train for variations of the typical emergencies that occur in their jurisdiction so they can respond to each emergency in a routine manner. Emergencies happen often and on a reoccurring basis, following a predictable pattern that rarely goes beyond the scope of the planned protocol for response. Crises, on the other hand, are unpredictable, nonroutine events that contradict stakeholder expectations and thereby threaten high-priority goals. Emergencies may escalate into crises, but most crises are not triggered by an emergency. For example, some crises evolve slowly and may be financial or reputational crises that do not directly threaten life, health, property, or the environment. Also, whereas emergencies are short-lived, crises can cause lingering effects for years after the trigger event.

Crisis managers must plan and prepare for emergencies that are likely to occur within their organization; however, the full crisis plan will rarely be needed to respond to an emergency. Because some emergencies can escalate into crises, all potential emergencies should still be identified in the risk assessment section of the crisis management plan. Further, since a series of emergencies could be precursors to a developing crisis, all emergencies within and surrounding an organization should be documented in incident reports. For example, a single worker injury may constitute an emergency, but a series of worker injuries may point to an underlying worker safety problem that could manifest into a major crisis in the form of a large accident, imposed safety regulations and fines, a union strike, or accelerated reputation loss resulting from perceptions of poor corporate responsibility.

Planning and Training

Emergency services are often summoned to perform remedial actions in an emergency. Emergency services typically include fire service, police, and emergency medical service personnel who train and prepare for responding to emergencies. Because emergencies occur so frequently, emergency services are able to respond by following routine procedures. Average citizens may also perform remedial actions in an emergency. Individuals train to respond in an emergency by taking classes to perform cardiopulmonary resuscitation (CPR) or to become Community Emergency Response Team (CERT) members. Depending on the organization, professionals may also be employed to respond to emergencies. For example, a hazardous waste specialist may be called on to assist in the cleanup of a chemical spill at a hospital. A localized chemical spill can threaten the environment if not properly addressed. However, as long as the hospital fulfills stakeholder expectations by following routine procedures to address the threat, a crisis will not occur.

In an organization, the crisis plan is typically developed and enacted by the management team, including representatives from each organizational department. In a municipality, emergency managers and executive-level personnel in emergency response services typically develop both the emergency procedures and the crisis plans. When an emergency overwhelms the routine emergency procedures, contradicting the stakeholder expectations of response capabilities, a disaster may be declared to request assistance from state, regional, or national sources. Disasters in which there is a significant loss of life or an inordinate amount of damage are often identified as crises for the communities in which they occur. Protocol for requesting and reimbursing assistance should be detailed in the crisis planning process. Because crises occur infrequently, all crisis plans should be tested and rehearsed periodically to avoid dilapidation.

When an Emergency Becomes a Crisis

The who, when, and where of an emergency may be unknown, but the range of emergencies that are likely to occur in a given region can be easily determined. Emergencies such as car crashes, fires, and accidents occur across communities. Emergencies that threaten human life are considered higher priority and are typically responded to more quickly than those that only threaten property. Although an emergency may be a tragedy for directly affected individuals, such as a family whose home burned down in a fire, the emergency is still routine for fire service personnel, who respond to fires on a daily basis. Weather-related events typical for a region that can be responded to in a routine fashion would also be considered routine emergencies.

Routine emergencies in one part of the world may be considered crises in another. For example, a blizzard in January that shuts down highways in North Dakota is a routine emergency. Blizzards are common in the northern plains and occur periodically most winters. In this type of an emergency in North Dakota, emergency service personnel are commonly dispatched to respond to car accidents, stalled vehicles, and cardiac arrest victims who overexerted themselves shoveling snow. Although calls for emergency services are higher than on a clear day, the response will still be routine for a winter in North Dakota and not likely overwhelm the response capacity of emergency services.

However, a blizzard in January in Florida—where snow is uncommon—would likely overwhelm response capabilities and threaten stakeholder expectations. A significant number of car accidents would likely occur because Floridians are unaccustomed to driving in such conditions. Also, the cold temperatures and fierce winds that accompany a blizzard can cause additional health risks, especially for those not used to dressing for cold weather. Thus, the same event may be considered a routine emergency in one region but a crisis in another because of the region's familiarity with the type of event and the ability of emergency response personnel and community members to cope with such an event.

Even in a region where the type of emergency is common, if the emergency overwhelms routine emergency response protocol, the emergency can become a crisis. For example, the northeastern United States is prone to cold weather and even blizzard conditions. However, in 2010, the region was hit with a series of snowstorms that overwhelmed routine response capabilities, halted traffic in some of the largest metropolitan areas, and forced the closure of most of the United States federal government. Although snow in the northeast region is typical, the amount of snow that fell during the storms was not typical, and the inability of municipal services to fulfill stakeholder expectations created a crisis. President Barack Obama dubbed the storms "snowmageddon," implying that the storms were apocalyptic in nature and clearly not routine emergencies.

Rhetorical Nature of Emergencies and Crises

Although the words *emergency* and *crisis*, and even *disaster* and *catastrophe* are often used interchangeably, there are some clear semantic differences. An emergency, as noted, requires immediate response to reduce threats to life, health, property, or the environment. A disaster is typically triggered by an emergency that has overwhelmed the local response capacity and caused a significant amount of damage. A catastrophe is evidenced by the total failure of multiple critical infrastructure systems, often caused by a widespread disaster. Emergencies can lead to disasters that are often considered community crises, and catastrophes are almost always considered a crisis for the affected community, agency, or organization.

The word *crisis*, however, does not automatically fit along the continuum from emergency to disaster to catastrophe. Crises do not follow a predictable pattern; they are unpredictable, nonroutine events. However, the most important distinction of crises from emergencies, disasters, and catastrophes is that crises are caused by a gap in stakeholder expectations. Crises do not need to involve death and destruction to threaten high-priority goals. An event or series of events that creates an expectation gap between the actions of an organization and the actions stakeholders expect of an organization can severely limit the operations or income potential of an organization without causing damage to life, health, property, or the environment. Crises, unlike emergencies, can also be rhetorically construed. A rumor that is not based on any actual damage, can result in a crisis because the reputational loss threatens the high-priority goals of an organization. Thus, a crisis can occur even if stakeholders just perceive an organization's actions to be out of line with their expectations.

Although an emergency may trigger a crisis and a crisis may require an emergency response, routine emergencies and true crises are not synonymous and should not be planned for in the same manner. Crisis managers who plan only for emergencies will not be prepared to respond when the crisis goes beyond the plan. Alternatively, if crisis managers do not watch out for routine emergencies, they could miss the warning signs of an impending crisis.

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See Also: Catastrophe, Definition of; Crisis, Definition of; Disaster, Definition of; Disaster Declaration; Emergency, Definition of; Emergency Management Agencies, City and County; Impact, Definition of; Incidents Versus Crises; Nonlinearity.

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Sabotage

Sabotage has different meanings in terms of its political and economic aspects, motivations, goals, targets, severities, methods, and causes. The term *sabotage* has a widespread popularity in everyday parlance, and certain/ordinary violent incidents or destructions can also be described as sabotage. The elements/wording used to explain the term *sabotage* have been continuously changed and varied, depending on social, economic, and political conditions of the environment. Before discussing these elements, the origin and historical background of sabotage is discussed first.

Origin of Sabotage

In the history of humanity, incidents that can be named as sabotage have always occurred, even though people did not call them sabotage. Nonetheless, the exact origin of sabotage can be traced back to 19th century. In the literature, sabotage is derived from the French word *sabot* (wooden shoe), and it was first discussed at the end of 19th century, with the French labor movement as a means of reaction. According to the story that gave birth to the word *sabotage*, French workers threw their wooden shoes into the mowing and threshing machines to protest increasing mechanization during the Industrial Revolution. Thus, the word *sabotage* was first used in the modern sense in reaction to changed economic/industrial conditions. In this sense, the early usage of sabotage can be associated with capitalism.

Today, the term *sabotage* is often used with terrorism to imply a human-initiated event within the context of terrorism. The reason for the close relation between sabotage and terrorism is that members of terrorist organizations use sabotage-like incidents in order to obtain their politically or religiously motivated aims. Given this context, terrorism and sabotage are thought of as sister words in our modern communities. Whereas terrorism is related to politically or religiously violent activities, illegal and systematic in concept, sabotage is an illegal activity that can also be realized by terrorists. The most important intersection of these terms is that they should both be called illegal rule-breaking behavior. The other important intersection of these terms is that it is difficult to quantify the social risks of such events.

Theoretical Conditions of Sabotages

Even though terrorism and sabotage have been used interchangeably in the literature, sabotage has its own theoretical conditions that should be fulfilled in order to label an incident as sabotage. The main condition for an event to be counted as sabotage is that the incident should occur in a place/environment that has lack of freedom or autonomy for its residents. Incidents are arranged/

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Investigators examine a derailed Iraqi Republic Railways locomotive for evidence of sabotage just south of Bayji, Iraq, June 5, 2010. Years of insurgency and sabotage have damaged the infrastructure of the railway. The purpose of sabotage is to damage, destroy, or subvert the operating system by targeting its infrastructure, its weakest point. As technology has advanced, sabotage has escalated.

organized in these kinds of places in order to take over control. Sabotage can occur in two forms within such places: either as a reaction to political, social, or economic status quo (*ultima ratio*) or as an action (instrument) to undermine the source of an opponent's strength (*prima ratio*). Sabotage can occur also as an individual's reaction to his or her environment since the goal of sabotage is not only to disrupt some aspect of the organization (particularly its system) but also to direct specific harm toward an individual.

Types of Sabotage

The type of sabotage is often determined by its consequences. In other words, destruction power of sabotage determines its type and classification. In order to define the sabotage in the modern sense, we must determine its current valid elements. These elements vary according to the type of sabotage, but the common element of all sabotage is destruction. The scale of sabotage depends on the legitimation of (re)action. The amount of damage varies according to the scale of the sabotage. For example, whereas simple sabotage is carried out in such a way as to involve a minimum danger of injury, an environmental disaster or the theft of nuclear material caused by detailed planned sabotage can be called a catastrophic sabotage with high consequences. There are many factors that affect the magnitude of sabotage. For example, excellence in protection or prevention measures, deterrent penalties, interest subjects, power of conflict parties, and tolerance of damage stemming from sabotage by the public (computability) are some of them.

Targets of Sabotage

With the exception of individual sabotage against individuals, the purpose of all sabotage is to damage, destroy, or subvert the operating system. For this reason, generally the infrastructure (its weakest point) is targeted, which is effective against the perfect running of a system. As the systems relaxing everyday life have been developed and the technology advances, usages of sabotage continue to escalate. The conventional attacks against pipelines, which are established to meet the needs of emerging energy, and virtual attacks against networks are some of them.

Motivations, Causes, and Tools of Sabotage

The motivating force of sabotage can be economic (profit) or political (i.e., autonomy, social revolution, recessions). Even the central motive of sabotage against a political target can be economic. A paradox can also be experienced. For example, sabotage as a reaction against the victimization of human rights can emerge as a new crime against humanity.

Depending on one or all of these motivations, there are different causes for sabotage, such as injustice, powerlessness, frustration, facilitation, or boredom, and amusement, but injustice stemming from inequity between involved parties is the most frequently cited cause. The goal of this motivation is either retaliation with destruction characteristics or restoration of equity with warning characteristics. The relationship between the severity of sabotage and the source of injustice depends on the degree of unfairness and on the solution process problems between the conflict parties.

Conventional, biological, nuclear, chemical, or virtual weapons are the tools of sabotage. Currently, the most commonly used tools are conventional or virtual weapons. Alarmingly, saboteurs can acquire the possibility to commit sabotage with nuclear or chemical weapons.

Conclusion

Depending on the above elements and in the modern sense, sabotage can be described as the deliberate, purposeful, and scheduled disruption or breakdown of the economic, social, or political system to achieve a designated economic or political goal by applying asymmetric, not calculable and predictable, unexpected, military, or criminal violence; with haphazard, impersonal, symbolic or chaotic character, generally against the infrastructures of systems on the basis of secret, military, and technical methods, using conventional, biological, nuclear, chemical, or virtual weapons without humanitarian or legal restriction.

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See Also: Arms Control; Blame, Politics of; Chemical Weapons; Civil War; Cyber Crime; Cyber Warfare; Denial-of-Service Attack; Department of Homeland Security (DHS); Foreign Policy Crises; Fraud; Hijackings; Hostage Taking and Negotiation; Income Inequality and Labor Unrest; Interstate War; Land Mines; Missiles; Nuclear and Radiological Weapons; Nuclear Proliferation; Nuclear Risk; Poverty; Protest; Religious Violence; Riots; Strikes; Suicide Bombings; Terrorism; War Crimes; Weapons Trafficking.

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Safety Policies

Businesses, government agencies, and critical infrastructure concerns need to have comprehensive safety policies in place to protect people and physical assets. According to the U.S. Department of Homeland Security, “critical infrastructure are the assets, systems, and networks, whether physical or virtual, so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, public health or safety, or any combination thereof. The critical infrastructure sectors that apply to this include chemical, energy, and nuclear reactors, materials and waste.” An operational safety policy for an enterprise or critical infrastructure concern must ensure operational excellence, system integrity, and safety. These policies must consider both human-made threats (terrorism, theft, vandalism) as well as natural threats such as earthquakes, floods, tornadoes, and hurricanes.

Safety policies need to be applied to all entities where there is a potential for loss. The U.S. government considers the chemical sector as one of its critical infrastructure elements with a great potential for loss. Other critical infrastructure elements include banking and finance, transportation, water systems, and the power grid. If there is a cyber attack on the banking industry or power grid, there may be loss of property and efficacy, but probably no human loss. Incidents at chemical plants, however, can easily escalate into situations where human life is at stake. The chemical industry is special because when an incident occurs at one of its facilities, the consequences of the event can be catastrophic and become an extreme event, as described by D. Sarewitz and R. Pielki.

Developing an Effective Safety Policy

Regardless of the mission of an enterprise, there are a number of elements required to develop an effective safety policy. Those elements include:

Management commitment: The senior leadership must support the safety policies of an enterprise. Leadership for safety goals and objectives should be rewarded at all levels within the enterprise. Management should develop a policy statement, establish a safety committee, encourage employee participation, establish a drug and alcohol program, and create achievable safety program goals.

Employee participation: Every employee, contractor, or visitor must be aware of the safety policies when they are within the bounds of an enterprise. Safety is a concern of all personnel, regardless of their role or position within the organization. Employees should be accountable for their predefined area of responsibility and personal actions. Clearly defined roles and responsibilities allow an enterprise to effectively manage resources and maintain production schedules. Personnel who are alert and well trained will ensure safe and efficient operations.

Administrative controls: Essential to the success of a high-performing enterprise is administrative controls. Easy-to-use controls will ensure clarity of operations, accuracy, and compliance.

Communication: Accurate, complete, and perpetual communication develops trust and ensures learning. Open communication should be used throughout all levels of the organization.

Continuous improvement: An environment that fosters continuous improvement will strengthen the safety of an enterprise. Lessons learned should be shared throughout the enterprise to improve safety, system integrity, and operational excellence.

Asset management: The system components of an enterprise should be designed and built utilizing industry standards and best practices. The enterprise needs to ensure that safety, reliability, and maintainability are designed into the system.

Community involvement: The enterprise must communicate potential hazards that may impact the local community, according to the Environmental Protection Agency. A. Laplante pointed out that an enterprise must identify hazard assessment describing release scenarios, potential offsite consequences, and a five-year accident history. It must describe prevention programs addressing the basic safety procedures, such as training, maintenance, and safety audits and emergency response programs that cover response plans, drills, and coordination with local planners.

Regulatory interaction: There are local, state, and federal regulatory agencies that provide guidance for safety policy.

Role of Safety Committee

The safety committee is the lead entity within an enterprise that establishes and enforces safety policies. The goal of a safety committee is to have all personnel involved with the company safety effort perform in an active manner, such as conducting accident investigations or planning employee safety training sessions. The committee can help communicate safety information to everyone in the enterprise and ensure that all employees understand how to work safely. Responsibilities of the committee include the following:

- Regularly inspecting the facility to detect unsafe conditions and work practices
- Identifying and implementing industry best practices
- Actively participating in safety and health training programs and evaluating the effectiveness of such programs
- Assessing personal protective equipment needs
- Planning safety promotions or incentives
- Planning improvements to existing safety and health rules, procedures, and regulations
- Overseeing emergency response preparedness, training, and drills
- Serving as a resource for safety questions
- Immediately investigating any workplace accidents
- Performing a job safety analysis

The safety committee will proactively mitigate safety issues in the workplace, control the costs associated with accidents and workers' compensation claims, establish training and education guidelines, and increase personnel awareness of safety.

To ensure that personnel are educated on job hazards, proper job operating procedures, and required personal protective equipment, the safety plan should outline various training and education methods depending on the job task. These include on-the-job training, job instructional training, and regular reviews of safety topics. Training should be given to all new employees, employees transferring jobs, or those performing new tasks and as needed by best practices or to reinforce the employee's knowledge. Some duties that expose the employee to specific hazards have their own training requirements.

Elements of Safety Plans

Safety policies need to be captured in an actionable plan. The safety plan will cover the following phases, described by F. Flammini:

- *Assessment:* The understanding of risks and vulnerabilities as well as expected results of possible mitigations. This can be achieved by analysis, modeling, and simulation.
- *Prevention:* The reduction of risk by predicting threat effects. This can be achieved by means of deterrence and other "passive" countermeasures (for example, security by design).
- *Detection:* The capability of real-time recognition of abnormal conditions or behaviors. This can be achieved by means of active sensors and other technological tools.
- *Response:* The quick reaction to threats. This can be achieved by adopting early-warning, situational-awareness, and decision-support systems.

Each safety plan should have the following elements, as defined by Regulations—Standards CFR 29 of the Occupational Safety and Health Administration (OSHA) Part 1926, Construction Safety and Health Regulation: basic safety rules; record keeping; housekeeping and sanitation; first aid; personal protective equipment; fire protection; hand and power tools; welding and cutting; electrical; ladders; scaffolding; guardrails, handrails, and covers; material hoists; motor vehicles; material storage and handling; concrete, concrete forms, and shoring; and use of cranes and derricks. Two critical elements of safety policy are the use of emergency response plans and process safety management (PSM).

Typically, emergency response plans consist of the following interrelated and interdependent elements:

- A highly structured, common, integrated crisis and emergency response organization, with clearly defined roles and responsibilities for team members
- Disciplined crisis and emergency response management processes
- Tools to assist members of the response organization to understand their roles and carry out their responsibilities
- Training programs to provide members of the response organization with insight into what they must know and be prepared to do to anticipate, address, and, whenever possible, prevent or mitigate crisis and emergency situations, and to carry out emergency response operations in a safe, effective, and efficient manner
- Drills and exercises to allow members of the response organization an opportunity to execute their roles and responsibilities, apply response management processes, and use tools in realistic, simulated crisis, and/or emergency response situations

All-risks-all-hazards emergency response management plans should be designed to help ensure readiness to deal with incidents of all types.

Safeguarding Chemical Facilities

Chemical facilities are compelled by the U.S. Department of Energy to provide emergency notification of large quantities of extremely hazardous materials, based on the requirements of the Comprehensive Emergency Response, Compensation, and Liability Act of 1980 (CERCLA).

The CERCLA legislation stipulates that every chemical site produce and maintain an Emergency Response Plan (ERP). The plan requires the following:

- A 24-hour emergency coordinator and an alternate 24-hour emergency coordinator. Information about hours of operation and personnel information must be collected.
- The emergency response methods utilized in the event of an unplanned release of an extremely hazardous substance, including on-site response capabilities and levels of training of facility personnel; the identity of fire, medical, and police in close proximity to the facility; on-site/off-site alarms for personnel notification; and evacuation plans, including routes, assembly areas, and methods to account for personnel.
- The location of equipment used to monitor or test the air from an unplanned release.

Oil, gas, chemical, and petrochemical facilities are required by OSHA to institute process safety management for hazardous chemicals, for which OSHA produced a standard. The PSM lists extremely hazardous materials and their threshold quantities. If a chemical plant has at least one of the chemicals at the threshold quantity, then it is required to implement PSM. The OSHA standard requires chemical sites to do the following:

- Create written plans to identify dangerous chemicals associated with processes and technology used in the hazardous processes.
- Conduct hazard assessments of unplanned releases and develop worst-case scenarios. These scenarios are consequence-based reviews of potential outcomes of an unplanned release.
- Address preparedness, response, and mitigation. Review hazard assessment and response mechanisms.
- Develop operating procedures for of all chemical processes.
- Train personnel on incident response.
- Establish management-of-change procedures. The management-of-change process is used when there are any changes to the chemicals used, piping, equipment, technology, or facilities.

The PSM requires chemical facilities to use one or more methods to conduct hazard analyses: what-if, fault-tree analysis, hazard and operability study (HAZOP), checklist, or failure mode and effects analysis (FMEA). Safety policies are required to provide guidance for a safe and secure enterprise.

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See Also: All-Hazards; Chemical Weapons; Critical Business Functions; Critical Infrastructure; Cyber Security; Environmental Contamination; Hazard, Definition of; Hazard Vulnerability Analysis; Hazardous Materials.

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Salvation Army

The Salvation Army is an international evangelical, Protestant, Christian ministry. It is present in nearly 120 countries and territories and is the second-largest charity in the United States. The Salvation Army's approach to crisis management includes pre-crisis training, crisis response and relief, and post-crisis recovery. The Salvation Army's organizational structure permits immediate, independent, local response to crises while rapidly benefiting from the support of the broader organization and its liaisons with other relief organizations, as well as regional, federal, and international authorities. The Salvation Army's worldwide crisis management services are flexible, adaptable, and scalable to the location and scope of the crisis. The Salvation Army's basic services are training, food service, shelter, emergency financial assistance, donations management, emotional and spiritual care, emergency communication, case management, cleanup and reconstruction, and facilitating collaborative partnerships.

Organization

Established in the United States in 1880, the Salvation Army began cultivating a reputation for providing immediate emergency relief by its response to the 1900 Galveston, Texas, hurricane. The Salvation Army further established itself as a reputable relief organization by its response to the San Francisco, California, earthquake of 1906. The Salvation Army's largest relief operation to date has been its response to Hurricane Katrina on the United States Gulf Coast in 2006. That effort secured $400 million in donations, served over 10 million meals, and contributed over 900,000 service hours from Salvation Army personnel and volunteers. The Salvation Army's annual expenditures approach $3 billion, with over 80 cents per dollar allocated to relief and social service work. The organization's relief services are supported solely by donations. It consistently ranks among the most preferred charities in the United States, as assessed by leading philanthropic journals. Peter Drucker, renowned management authority of the latter 20th century, has called the Salvation Army the most effective organization in the United States.

Training

During a crisis event, the Salvation Army relies on trained workers to coordinate emergency relief and deliver fast, efficient service to survivors and first responders. The Salvation Army's disaster training program is designed to equip professionals and volunteers to serve during times of crisis. The training program was initiated in 2004 with the support of the Lilly Endowment. Courses are conducted in a classroom environment and online.

The training program includes courses developed by the Salvation Army and other partner organizations such as the U.S. Federal Emergency Management Agency (FEMA), whose expertise is widely recognized. Disaster training courses are rated according to difficulty. Basic training includes general information and skill development. Intermediate training is technical but applicable to a broad number of disciplines. Advanced training encompasses information that is technical, specific to unique jobs or responsibilities, and assumes that participants already understand relevant technical terminology and principles.

Response and Relief

The Salvation Army's unapologetic Christian mission is this:

> The Salvation Army, an international movement, is an evangelical part of the universal Christian Church. Its message is based on the Bible. Its ministry is motivated by the love of God. Its mission is to preach the gospel of Jesus Christ and to meet human need in His name without discrimination.

As an expression of its Christian foundation, the unifying element of the Salvation Army's crisis management strategy is delivering spiritual and emotional comfort to survivors and emergency responders. The Salvation Army is a mass-care support agency that assists first responders but is not itself a first responder.

Perhaps the most familiar Salvation Army relief services are hot meals and cold drinks served from a Salvation Army mobile "canteen" to survivors and emergency personnel. Canteens are full-service kitchens-on-wheels that can prepare and serve up to 1,500 meals daily. Specially equipped Salvation Army tractor-trailer kitchens can produce tens of thousands of meals per day. Additionally, during disasters the Salvation Army may provide shelters for survivors with no other place to go.

During crisis management, the Salvation Army provides direct financial assistance to survivors through a system of trained volunteers and professional caseworkers. During the early stages of a crisis, this assistance is focused on survivors' most urgent needs: food, clothing, shelter, and medical. The Salvation Army accepts donations on behalf of crisis survivors and is one of the nation's leaders in collecting, sorting, and distributing charitable goods. During crisis management, the Salvation Army freely distributes donated items to survivors through a network of temporary warehouses and distribution centers. During crises when traditional communications networks are inoperative, the Salvation Army provides emergency communications through the Salvation Army Team Emergency Radio Network (SATERN) and additional coordinated amateur radio networks.

Recovery

When immediate needs have been met, the Salvation Army's crisis management strategy transitions from emergency assistance to long-term recovery and supporting survivors in the development of personal disaster recovery plans. Often, recovery service begins with the distribution of Salvation Army cleanup kits, which contain many of the supplies necessary to clean up damaged homes and businesses. During catastrophic events, Salvation Army recovery and rebuilding may continue for years, until homes and communities are fully rebuilt.

Partnerships and Collaboration

In crisis events, the Salvation Army actively collaborates with local and state emergency management agencies, nationally with FEMA, and internationally with the United Nations. The Salvation Army also stands with other volunteer and charitable crisis responders, including leadership in National Voluntary Organizations Active in Disaster (NVOAD). The Salvation Army is part of the U.S. Department of Homeland Security's National Response Framework (NRF).

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See Also: Agency Notification and Mobilization; Collaboration; Coordination; Disaster Recovery; Emergency Management Agencies, City and County; Federal Emergency Management Agency (FEMA); Pre-Crisis Training and Planning; Preparedness; State Emergency Management Agencies; Volunteer Coordination.

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Scapegoating

In the context of crises, companies, organizations, government officials, and celebrities are frequently accused of wrongdoing. A common response is the intent to move away the blame for the crisis or parts of the crisis from themselves in order to reduce reputational damages and/or financial losses. This kind of crisis response is identified as a specific rhetorical strategy known as "scapegoating" or "shifting the blame" in the crisis management literature. Several typologies of crisis response strategies are available that include different forms of scapegoating. These typologies have their theoretical roots in corporate apologia, impression management, image restoration theory, and situational crisis communication theory. This article includes definitions and descriptions of different forms of scapegoating, the theoretical roots of scapegoating, and several examples and recommendations for the use of scapegoating as crisis response strategy. In most cases, scapegoating results in amplified reputational damages rather than protective effects for organizations using this strategy.

A scapegoat can be defined as a person, a group of persons, or an organization that is made to bear the blame for something negative in place of somebody else. From a psychological perspective, scapegoating refers to a hostile process in which people blame someone else for their own misbehavior or something else they perceive as negative. It may also refer to projections of negative feelings—often based on inappropriate accusations—toward a broader group of people not belonging to one's own group.

In the context of crisis management, scapegoating is identified as part of a broader set of crisis response strategies. Crisis response strategies are the verbal messages and nonverbal actions organizations use to address a crisis and the responsibility for the crisis. The scapegoating strategy refers to the intent of organizations accused of wrongdoing to blame persons or groups of persons outside the organization. In this case, scapegoating is part of a denial posture by which organizations try to remove any connection between themselves and the negative consequences of the crisis. In other cases, organizations have to bear parts of the responsibility but try to dissociate certain individuals (e.g., employees, the chief executive officer) or subsidiaries of a company from the company itself. They become scapegoats of the crisis as the organization claims that these individuals or subsidiaries acted on their own behalf and/or without official permission or knowledge of the organization. In this context, scapegoating is part of a differentiation posture of organizations.

Theoretical Roots

The research on corporate apologia was the first theoretical perspective that developed taxonomies of crisis response strategies, including different forms of blaming scapegoats. Apologia scholars such as Keith Michael Hearit posited that organizations are perceived as individual persons and defend themselves against allegations of wrongdoing. They do so by offering a self-defense discourse to protect their reputation. When dealing with charges of unethical behavior, they can take one of five postures: denial, counterattack, differentiation, apology, or legal. The intent to blame scapegoats is reflected by certain variants of the denial and the differentiation postures. When companies do not accept any guilt for a crisis, they can try to shift the blame to a scapegoat who did not act on behalf of the company (denial). In many cases, the company has to accept a certain level of responsibility and might try to blame employees or subsidiaries and dissociate them from the organization as a whole (differentiation posture). Those individuals or subsidiaries can then be punished, fired, or prosecuted. By doing so, the accused organization tries to demonstrate that the cause of the crisis has been eliminated.

Case Studies in Scapegoating

In most cases, it is not recommended to use scapegoating as a crisis response strategy unless the organization is absolutely certain that it does not bear some level of responsibility for the crisis. Evidence-based recommendations for the use of crisis response strategies were produced by situational crisis communication theory (SCCT).

This framework suggests that stakeholders attribute responsibility for a crisis to an organization based on their perceptions of the crisis type (e.g., natural disaster, accident, or mismanagement), the history of crises of an organization, and the prior relationships between the organization and its stakeholders (prior reputation). Experimental studies produced evidence that the more stakeholders attribute responsibility for the crisis to an organization, the more negatively they evaluate the reputation of that organization. If stakeholders observe a gap between their own attributions of responsibility and the level of responsibility as publicly accepted by the organization, this will result in reputational damages and negative feelings of the stakeholders toward the organization.

Therefore, SCCT recommends using the scapegoating strategy as part of a denial posture only in situations when organizations are not at all perceived as being responsible for the crisis and when stakeholders are not in danger anymore. However, as this is rarely the case or difficult to assess with absolute certainty, it is always a risky choice. Most case studies in the literature are examples for the negative effects of the scapegoating strategy, as in most cases its application resulted in public outrage, negative media coverage, and the amplification of reputation damages. Scapegoating often triggers counterallegations by the one who was blamed (the scapegoat). This usually initiates a public blame game that, because of its news value to journalists, receives substantial news coverage. Most stakeholders react with frustration and anger to those blame games, as the organizations in question are perceived as if they would not care for the real concerns of the victims or potential victims of the crisis. The following crisis cases are typical examples for the use of scapegoating and its effects.

Union Carbide Leak, Bhopal, India, 1984

A leak of methyl isocynate caused thousands of deaths (estimates run from 3,800 to over 20,000) in Bhopal, India. The U.S. company Union Carbide tried to blame its subsidiary Union Carbide India Ltd., which was in control of the factory in Bhopal. The company tried to dissociate itself from the subsidiary. The results were public outrage among the Indian population, substantial negative media coverage, and several lawsuits.

Exxon Valdez Oil Spill, Alaska, 1989

The oil tanker *Exxon Valdez,* operated by Exxon, struck a reef and released more than 10 million gallons of oil off the coast of Alaska. Exxon chose to blame and fire the captain of the tanker, Joseph Hazelwood, as he was intoxicated and set a risky course. However, the company had to admit that it knew about the alcohol problems of Hazelwood. Therefore, the scapegoating strategy had only a limited effect on restoring Exxon's reputation, as the company could have prevented the crisis by appointing a more reliable captain.

BP Oil Spill, Gulf of Mexico, 2010

One of the largest oil spills in history happened in the Gulf of Mexico in 2010, where almost 5 million barrels of crude oil were released from a seafloor oil gusher that had been damaged by an explosion at the Deepwater Horizon drilling rig. During a Senate hearing in May 2010, leading managers of the three companies involved—BP, Transocean, and Halliburton—blamed each other for being responsible for the oil spill. As BP was the main company that developed and coordinated the drilling project, the scapegoating strategy was the wrong choice. BP was perceived to bear a substantial part of the responsibility. The Senate hearing triggered public outrage, especially among the population of the Gulf Coast that was still suffering physically and economically from the catastrophe. U.S. President Barack Obama was cited by the media with depicting the hearing as a "ridiculous spectacle."

Love Parade Panic, Duisburg, Germany, 2010

During the Love Parade festival in July 2010, the largest techno music festival in Europe, a stampede killed 21 people after mass panic broke out in a tunnel. More than 500 participants were injured. The organizer, Lopavent Ltd.; the police of Duisburg; the mayor of Duisburg, and authorities refused to take responsibility for the crisis and blamed each other for the stampede and/or security failures. Using a very aggressive form of the scapegoating strategy substantially amplified the reputation damage that resulted from the crisis, especially for the mayor of Duisburg and the police. Analysis of how stakeholders responded to that blame game on different social media channels showed that they reacted with anger and frustration, as they perceived the three organizations to bear some level of responsibility.

The work on corporate apologia stimulated a great deal of research that produced a number of competing typologies of crisis response strategies. Among the most prominent streams of research are impression management, the image restoration theory (IRT) by William Benoit, and the situational crisis communication theory (SCCT) by Timothy Coombs and Sherry Holladay. Similar to the work on apologia, scapegoating appeared in those typologies as shifting the blame (IRT), denouncement (impression management), or scapegoating (SCCT). Another variant of scapegoating is the claim of an organization that the wrongful act was performed in response to another wrongful act of another organization or person. As the wrongdoing was provoked by someone else, this strategy was named *provocation* and is a form of evading responsibility for the crisis (IRT).

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See Also: Blame, Politics of; Credibility; Crisis Communications; Public Image; Public Relations.

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Scenario Planning

Crisis management skills, expertise, and insights into the scope, dynamics, and variables associated with managing a crisis situation are typically embedded in scenario development. Scenarios exist to test the skills of managers, present new and difficult problems to leadership teams, demonstrate how groups and organizations function, and replicate conditions, demands, constraints, and problems to be confronted when facing genuine real-world crises. Scenarios serve as the foundational element of emergency and disaster exercises and drills to verify readiness for, confirm overall preparedness for, and examine approaches toward effective crisis management. Scenarios at their best describe as much of the environmental and physical features in a pre-crisis setting as possible, leaving only minimal realistic elements to ambiguity and chance, such as weather, unexpected interruptions, diversions of key personnel, and the like.

Scenarios are most often developed for use by governments, military organizations, or large private-sector firms as part of a comprehensive exercise meant to test decision making, challenge executive leadership, foster better problem analysis,

Case Study: Scenario Planning for a Multicar Accident

In a scenario development, Chief Thomas of the Urbanville Fire Department wants to determine if his three fire companies, consisting of five trucks, three pumpers, and three ambulances, can adequately respond to a multicar accident on the interstate highway that runs alongside his community where one of the vehicles is a truck carrying some anhydrous ammonia and some spillage of that chemical poses risks to the highway vehicles and about 25 percent of the town of Urbanville.

He decides on a tabletop exercise where leaders representing police, fire officials, EMTs, emergency operations center (EOC) staff, hospital staff, and citizen volunteers representing local businesses, residents, and motorists are asked during a three-hour discussion how they would likely respond to this crisis. The scenario asks town leaders to develop a response plan that minimizes casualties, property damage, and risks of extensive evacuation in addition to making decisions about closing the interstate itself to manage the crisis.

The scenario is detailed enough for each player to understand the crisis situations they are facing, and it outlines the expected—or most effective—outcome expected of key figures like police, fire, and EMT personnel. It is a goal or objective that most scenarios include to provide a metric for gauging the extent to which players tried to achieve their assigned outcomes. Where possible, all realistic aspects, such as buildings, intersections, highway features, chemical spill toxic characteristics, and numbers of trained responders available, are clearly delineated in the scenario. Any special constraints, barriers, limitations, and obstacles should also be included. Scenarios cannot capture every fact or risk dynamic, so some issues will of necessity be ambiguous or undefined.

In the scenario, Chief Thomas outlines the role, responsibilities, and overall tasks and objectives he expects the different emergency leaders to demonstrate and, in very general and broad terms, what they must accomplish. He provides a general description of the accident site, a graphic map, and communications equipment to simulate real-world crisis communications. He then allows the group to manage the crisis on their own in a fully interactive and unscripted open discussion, then stops the drill after two hours of deliberation, group analysis, and discussion. The target group then reviews what was done during the drill and makes recommendations, as necessary, to update the scenario for future use. The scenario outcomes designated for this event are as follows:

- Development of a viable response plan by experts that addresses key aspects of the crisis
- Expert leaders agree on tactical approaches and operational options to resolve the crisis
- Experts discuss courses of action chosen and results observed during the crisis exercise

promote sharper problem-solving skills, provide novel or complex issues, or compel experts to assess an unexpected or persistent and enduring dilemma that often is associated with loss of life, property, and extensive damage. Scenarios can be written to test leader abilities to size up a situation, to determine if all key issues are understood before a strategy or remedy is prepared, or to create a new environment of challenges raising issues never confronted before. Scenarios also aim to uncover dysfunctional patterns of behavior, unproductive processes, and ineffective systems that may interfere with effective crisis management. Scenarios also are designed to shed light on crisis complexity and the interdisciplinary nature of events where, for example, police, public health workers, emergency medical techcnicians (EMTs), physicians, disease experts, and the Federal Bureau of Investigation (FBI) may all be involved in determining the locus of a mysterious pathogen outbreak that is felling teenagers in several communities. Scenarios tend to drill operational experts on both routine and nonroutine situations where they are expected to formulate pragmatic solutions in the midst of a crisis. Examples of this include pilot training for landing jet aircraft without landing gear, training managers how to deal with EMT response coverage in a major city where 20 percent cuts in personnel and ambulances have occurred, and developing skills in a fire chief for handling a dangerously complex HAZMAT toxic release of poisonous gases in an urban environment adjacent to a busy interstate highway.

The overall purpose of a scenario is to replicate and summarize enough key elements of a crisis situation that reflects a snapshot of an emerging emergency or disaster just seconds before it ripens into a full-fledged crisis. The immediacy of the scenario is intended to provide all the key elements, background facts, terrain, resources, geographic and meteorological details, situational placement of buildings, equipment, people, and triggering events that precipitate the crisis itself. Exercise participants are then launched into the situation with only their peers, their experience, and their perception to guide them. Sometimes a scenario is used to validate a CONOPS (concept of operations plan) involving a unique or novel situation never confronted before. An example would be how to manage a disease outbreak in a large urban area where a combination of local, state, and federal agencies and experts would be involved in assessing the situation and supplying strategies and pathways for effective management of the outbreak.

A degree of ambiguity is always expected in scenario development, as humans do not possess perfect synoptic vision of real-life situations where key details may be left out. It is common that eyewitnesses and experts miss or overlook integral details in sizing up the scope and complexity of a crisis as it unfolds. Perfect knowledge of all the issues and variables in a real crisis is often impossible to attain, and crisis managers must always do their best to examine all the relevant factors involved in getting an accurate and comprehensive operational picture of the situation. The key is including enough detail about the issues, operations, movements, placement, orientation, and disposition of people, buildings, equipment, vehicles, response resources, and other ground truths essential to provide a common operational picture for all persons involved in the exercise or drill.

Scenarios Relevant to Crisis Management

Scenarios most relevant to crisis management tend to focus on five major areas of inquiry: (1) leader behavior and decision making; (2) group problem analysis and strategy development; (3) confronting novel and unexpected crisis situations; (4) examining organizational cooperation, communication, and collaboration in addressing a crisis; and (5) assessing implementation and execution strategies for resolving the crisis with an eye toward overall successful crisis management from beginning to end. Naturally, there are other variations, but each of the first four is segmented on purpose to examine in some detail the issues that arise at different stages of a crisis. The fifth approach tries to assess the overall performance of all elements in settling and managing the crisis.

Scenarios aimed at assessing leader behavior may focus solely on leader perceptions, decisions, analysis, and collaborative managerial decisions where the time period covered is the first eight hours of a disaster. Scenarios focused on organizational cooperation and communication steer their emphasis primarily to how agencies, offices, and bureaucracies interact and cooperate during a crisis at crucial times, such as the first two days of a prolonged crisis. Scenarios that raise unique and novel problems aim to examine how leadership teams mobilize and focus their expertise and resources to tackle unforeseen issues and develop creative solutions to problems never encountered before.

Realism and authenticity in scenario details, assumptions, operations, and requirements are normally articulated in the exercise design phase, with particular attention to any artificialities that may exist. For example, multiday exercises that intend to force decisions on complex crises that cannot be resolved in 24 hours may be artificially reduced in an exercise scenario where a three-hour exercise period is meant to equal one full day's work. On the other hand, scenarios that contain too many artificialities undercut the overall purpose and objective of emergency exercises and erode the validity of the scenario in the minds of participants and players. Scenarios often spell out in detail the circumstances, resources, staff, equipment, options, and overall situation that a leadership team faces when an exercise is launched. This is done to minimize the creation of missing "facts" or "ground truth" details during an exercise, which may undermine the exercise and its objectives.

Below are examples of broad situational scenarios that are most often used to test leadership skills of emergency and disaster managers. These scenarios include the following:

- Environmental conditions, weather, town maps, emergency resources, business and commercial structures at risk, and local response capabilities, which may be part of a complex scenario where a midwestern town must decide how it will deal with a tornado of above-average ferocity given 45 minutes of warning.
- Environmental conditions, weather, town maps, industrial and commercial properties at risk, and local response capabilities may be part of a complex scenario where an Atlantic coastal town with an adjacent nuclear power plant must decide how it will handle emergency staffing, evacuation, protection, and sustainment of the plant and other key issues with two days warning of an approaching category 3 hurricane.
- Environmental conditions, weather, town maps, industrial and commercial properties at risk, neighborhood and school vulnerabilities, and local response capabilities where a railway spill from seven tanker cars within one mile of town limits releases highly toxic gases that eventually envelop the town and adjoining highways with deadly fumes lingering for at least 10 hours.

Development of Crisis Scenarios

Development of crisis scenarios starts with an accurate assessment of the actual people, resources, equipment, and external assistance that are likely to be available when a specific emergency situation begins. It then moves on to describe the situation, a location, identifying characteristics, and embedded risks that the overall crisis manager must weigh in formulating his or her operational strategy for managing and alleviating the crisis. Often, a scenario will include which specific emergency functions are to be tested or exercised, such as triage, staging, evacuation, or victim extraction. The scenario must provide enough information so that these functions can be assessed, observed, and evaluated.

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See Also: Disaster Drills; Exercises; Pre-Crisis Training and Planning; Preparedness; Training.

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Search and Rescue

Search and rescue is a broad term applied to a variety of operations focused on locating and assisting persons who are in danger or distress. Search-and-rescue operations are conducted by many different organizations, from local law enforcement agencies to international humanitarian organizations, and specific search-and-rescue techniques have been developed for many different situations, from land searches for survivors of disasters (such as earthquakes or floods) to searches for ships or persons lost or in distress at sea. Although search-and-rescue operations may recover property as well as persons, the highest priority is generally accorded to saving lives of those in distress while also safeguarding the lives of the search team.

Maritime Search and Rescue

Given the vast area covered by the world's oceans and the fact that much of this area is far from both territorial waters and established shipping lanes, international cooperation is key to maritime search and rescue. The International Convention for the Safety of Life at Sea (SOLAS), adopted in 1914, was the first international convention to deal with issues of maritime search and rescue, along with many other safety issues. The SOLAS convention deals with many aspects of maritime safety, such as ship construction, radio communications, and securing of cargo, and it has been modified and amended many times since 1912, when it was motivated after the sinking of the *Titanic*. Chapter V of SOLAS is the section most relevant to maritime search and rescue, as it spells out the obligation of ships to respond to others in distress. The rules of this chapter apply to all ships, including fishing vessels and private boats, while many of the other regulations in SOLAS apply only to merchant vessels.

The International Convention on Maritime Search and Rescue was adopted in 1979 and came into force in 1985; this convention builds on the obligations specified in SOLAS for one ship to assist another in distress, and it establishes an international system of maritime search and rescue. After adoption of the convention, the International Maritime Organization began the process of dividing the world's oceans into 13 search-and-rescue areas, with each party to the convention being responsible for specific regions; this process was completed in 1988. Parties to the convention agree to a number of obligations, including establishment of a basic search-and-rescue service, creating rescue coordination centers to be operated 24 hours per day, coordinating search-and-rescue operations with neighboring states, establishing detailed plans for search-and-rescue operations, and continuing a search until there is no reasonable hope of rescuing survivors.

Land Search and Rescue

In land search and rescue, as in maritime search and rescue, the total area to be searched is generally divided into segments, with different segments assigned to different teams. Certain pieces of information can help guide and limit the search. One such piece is the point last seen (PLS), which is the last place a witness reported seeing the person; this information is useful because it helps establish the total area to be searched. For

Two soldiers from the Home Front Command's Search and Rescue Company look for victims at a community center in Sderot, a western Negev city in the southern district of Israel that was hit by a Kassam rocket, May 17, 2007. Over the course of about a week, a barrage of over 100 Kassam rockets landed in the town and surrounding area; Hamas openly claimed responsibility for the attack.

example, if a hiker was seen at a particular point, it is possible to calculate an upper limit for how far he or she could have traveled in the time since the sighting. The concept of the last known position (LKP) is similar but does not require eyewitness identification, so may thus lack the time component of the PLS; however, an article of clothing or a unique shoe print could identify a location as one the person being sought had passed through.

Several different search methods have been developed for land search and rescue; some require trained searchers, while others can make use of average citizens without particular training or expertise. The probability of detection (PoD) in a particular case refers to the likelihood of finding the subject with a particular search method. Generally speaking, more thorough search methods have a higher PoD but are also more time-consuming; organizing a search for a (presumed) living person often requires a trade-off between the most thorough methods and the quickest methods, to avoid locating a corpse rather than a live human being. A grid search, in which the search team forms a line and moves slowly through the search area, is a thorough but slow type of search; a trained team can cover one mile in about 3.5 hours. Keys to a successful grid search are maintaining even spacing among the team members and covering all the areas assigned while not avoiding difficult areas, such as patches of thorns. A hasty search takes the opposite approach: a small team of trained researchers moves quickly through the search area, looking for clues of the locations of a lost person. Hasty searches are most useful when a high-probability area has been defined—essentially, when there is a high probability that the missing person is within that area. In a bastard search, the search team looks in the obvious places for the missing person; this type of search is often combined with the strategy of containment, in which searchers station themselves in locations where the lost person is likely to appear, such as along a road.

Canine Search and Rescue

The use of trained search dogs is an important tool in many search-and-rescue operations; in the United States alone, there are over 150 canine search-and-rescue units. Canine search and rescue takes advantage of dogs' sensitive sense of smell and the fact that both living and dead human beings emit scent particles that can be detected by a trained dog. Normally, teams consist of a search dog and handler, and each team is assigned to systematically cover a particular segment of the area to be searched. Canine search-and-rescue operations have several advantages: because they rely on their sense of smell, dogs can work effectively at night and in heavily populated areas, and they are effective even in situations where sight is limited, such as heavy forest or in the debris left by an earthquake, tornado, or flood.

Robot-Assisted Search and Rescue

Robots are often used in search-and-rescue operations in hazardous environments such as damaged buildings, when the lives of human and canine searchers could be imperiled by entering the structure to search for victims. A search-and-rescue robot is typically equipped with a camera and/or sound-sensing equipment, providing information to human searchers who can remain in a safe zone outside the area of collapse. Search-and-rescue robots can maneuver in spaces too small for either humans or search dogs, move in zigzag patterns, and be mobilized to any point in the search site, increasing the probability of quickly locating victims near the center of the area; normally, human and canine searchers work from the perimeter inward. Robots can also bring food and water to victims, increasing their probability of survival.

The Oklahoma City bombing in 1995 increased interest in using robots for search and rescue. They were not used in that disaster, but many researchers suggested ways they could have been employed. The World Trade Center (WTC) bombing in 2001 is the first documented case of using robots for search and rescue. In that crisis, robot search and rescue was coordinated by the Center for Robot-Assisted Search and Rescue and included scientists from universities, military operations, and private companies.

Evaluating Search-and-Rescue Efforts

Search-and-rescue missions are often carried out under hazardous conditions, such as during storms at sea or through partially collapsed buildings following an earthquake. Because the goal is generally to minimize loss of life, hazards to the rescue team must be balanced against the possible lives saved through survivor rescues. Because no organization has unlimited resources for search-and-rescue missions, the optimal use of those resources is also an issue in planning and evaluating search-and-rescue efforts.

The U.S. Coast Guard has established a performance benchmark to evaluate its efforts in saving lives. Although the Coast Guard's mission is maritime safety, the general principles of this benchmark can be applied to other types of search-and-rescue efforts. The benchmark is calculated as a percentage using the following equation:

$$LS / (LS + LLB + LLA + LUF)$$

where LS = lives saved, LLB = lives lost before notification, LLA = lives lost after notification, and LUF = lives unaccounted for. From 2008 to 2013, the Coast Guard's goal for this benchmark has been in the range of 76 to 78 percent.

The Coast Guard has also established two more specific benchmarks. One is the percentage of mariners in distress who have been saved after the Coast Guard has been notified. This benchmark is calculated as

$$LS / (LS + LLA + LUF)$$

where LS = lives saved, LLA = lives lost after notification, and LUF = lives unaccounted for. Because lives lost before notification is removed from the denominator of this statistic, it returns a higher percentage of lives saved. From 2008 to 2013, the Coast Guard's goal for this benchmark has been in the range of 83–84 percent.

A third benchmark refers to property and is calculated as

$$PS / (PS + PL + PUF)$$

where PS = property saved, PL = property lost, and PUF = property unaccounted for.

Annette Adams and colleagues undertook a study to derive a rule to help decide how long search-and-rescue missions should be continued. They examined all search-and-rescue missions in Oregon from 1997 to 2003; a decision rule was developed on missions from 1997 to 2000 (1,040 searches involving 1,509 victims) and validated on searches from 2001 to 2003 (1,262 searches involving 1,778 victims). They found that nearly all missing persons still alive were located within 51 hours, and that by 100 hours, nearly all living or deceased missing persons had been found. They also found that land searches were more likely than water searches to locate survivors, and that missing persons age 60 or older had a lower probability of being found alive. Although over 99 percent of missing persons still living were found in 51 hours or less, over half (56.6 percent) of longer searches also located a survivor, suggesting that not all searches should be abandoned at 51 hours, but that the search manager should consider factors such as the age of the missing person and whether the person was missing on land or on the water.

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See Also: Avalanches and Landslides; Blizzards; Earthquakes; Federal Emergency Management Agency (FEMA); Public Safety Canada; State Emergency Management Agencies.

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Severe Acute Respiratory Syndrome (SARS)

Severe acute respiratory syndrome, or SARS, is a severe form of pneumonia that first appeared in the Guangdong Province of China in late 2002. SARS is a viral infection that is primarily transmitted through the respiratory droplets of infected individuals, but it can also be transmitted through surface contact with the virus, which can live up to six hours on some surfaces. Like other viral infections, SARS spreads quickly through close contact with infected persons and is particularly disturbing to health authorities because it is socially communicated and the initial symptoms of the disease are similar to the flu and other common illnesses. At this time, there is no vaccine or treatment shown to consistently treat victims of SARS, nor is there any rapid screening test that can help detect SARS in large groups of people. The mortality rate of infected persons is around 9 percent to 12 percent, although the rate increases dramatically for individuals over 65 years old.

The outbreak of SARS in China serves as a reminder of government's key role in the early containment of a disease outbreak in a global society. The Chinese government was globally criticized for not informing the World Health Organization (WHO) of the outbreak in their country in a timely manner despite many information requests. The lack of cooperation and honesty exhibited by the Chinese government during the onset of SARS led to the disease spreading quickly to 32 countries and regions throughout the world. Despite an increase in global cooperation by China, SARS infected over 8,000 people and claimed 774 lives.

Addressing the International Spread

To confront the international spread of SARS, international public health authorities issued strong travel warnings and suggested that airports screen passengers departing from known infected areas for symptoms associated with the disease. Additionally, the health authorities instituted the use of basic public health techniques of isolation and quarantine to stop the virus from spreading. Isolation is the practice of separating infected individuals from the general population to prevent further transmission of a disease. Quarantine is a more precautious counterpart to isolation and works to separate individuals who may be infected but do not yet present symptoms. It may be important to note that these techniques are optimally carried out in a voluntary manner; however, the U.S. government has legal authority at the federal, state, and local levels to implement mandatory isolation and quarantine of individuals or entire communities. These containment strategies appear to have been successful in stopping the spread of the SARS virus. Since 2004, there have been no new reports of SARS, although the WHO and the Centers for Disease Control and Prevention (CDC) remain vigilant to the possible reemergence of the virus.

Managing SARS

For most crisis managers, managing a crisis such as SARS begins at the community level with preparedness planning and environmental surveillance. Because of the widespread effects of a disease outbreak such as SARS, planning should be a collective effort between responder agencies and large community institutions. Containment facilities should be identified, and practices for operating these facilities should be developed on multiple levels of threat, ranging from the identification of the first case to complete community exposure.

SARS is a nationally notifiable disease, and as such, community health practitioners must remain vigilant in the immediate reporting of possible cases. If SARS were to reemerge, infected individuals should be isolated away from health care facilities to prevent the spread of the disease to health care workers and other patients. Instead, isolation should be conducted in a designated facility or in the home of the infected individual. Sufficient control measures should be developed and maintained in order to prevent the exposure of others.

Next, individuals who may have been exposed to the infected person or persons, known as contacts, must be identified and monitored. Monitoring contacts can be conducted using either active or passive techniques. Both active and passive monitoring require the establishment of direct communication, usually regular telephone calls or person-to-person meetings, between the contacts and public health authorities. In passive monitoring, contacts are responsible for reporting any symptoms to authorities, while active monitoring involves direct assessment of contacts by health authorities. The decision to use active or passive monitoring depends on how and where individuals are quarantined. Active monitoring is also more time-consuming and costly than passive monitoring; however, active monitoring may provide more control over the accuracy of symptom reports.

If the number of cases continues to increase, then more stringent measures of control may need to be initiated. Exposed individuals should be quarantined at their residence or a designated facility. Additionally, exposed health care workers may need to be put on restricted duty, working only in a quarantine facility and remaining there or in their homes when not on duty.

If the number of infections continues to grow to the point where the source of the infection is no longer identifiable, then social distance measures should be implemented at the community or regional level. Places where individuals congregate, such as schools, churches, work, libraries, post offices, and public transportation facilities, should be closed, and social events such as concerts should be canceled. This technique is commonly referred to as the “snow day” approach. This practice may need to remain in effect for approximately 10 days to stop the transmission of the disease.

If the situation continues to worsen to extreme proportions within a community and the above control measures do not appear effective in stopping the transmission of the disease, a community-wide quarantine may need to be implemented. This large-scale quarantine includes activity restrictions (i.e., staying in one’s home) for residents and using active monitoring for the entire community. Additionally, to limit travel in, out, and within a community, security checkpoints may be necessary to prevent the further spread of the disease to other communities.

Educating the public should be an ongoing public health mission to supplement planning and surveillance. For example, providing information on how individuals can protect themselves before and during an outbreak by using proper hand-washing techniques and coughing hygiene can also help stop the spread of other similar health concerns. The CDC and WHO have a variety of materials that should be helpful in the ongoing efforts to educate citizens and prepare a community for a disease outbreak such as SARS.

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See Also: Epidemics; Infectious Disease; Influenza; Pandemics; Preparedness; Public Health Surveillance; Quarantine; World Health Organization (WHO), UN.

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Sewage Spill

The term *sewage* is used to describe the untreated water-carried wastes that are excreted from homes, offices, and industries. It includes fecal matter, urine, washing and kitchen wastes, and industrial waste. It is also known as wastewater, and it is funneled to treatment plants through a network of pipes called the sewer system. Sewage can also be used to refer to raw sewage, septic tank waste, and sewage sludge. Sewage spill is an overflow of this wastewater being transported in sewers or underground pipelines into the environment. In U.S. terms, sewage spills occur when the wastewater being transported via underground pipes overflows through a manhole, cleanout, or broken pipe. Sewage spills can cause serious health hazards, damage to homes and businesses, and threats to the environment, local waterways, and beaches.

There are three main types of sewers used in most cities of the world. They are sanitary sewers, stormwater sewers, and combined sewage systems (sewage and storm water). Sanitary sewers carry sewage from private and business premises to sewage treatment plants. Stormwater sewers carry surface runoff from rooftops, car parks, and streets. They include gutters, ditches, and underground pipelines. Combined sewers are open to surface drainage and carry both sewage and stormwater runoff. Sewage spills can occur in inflow and outflow pipes in private or business premises as a result of clogging or flooding of pipelines leading into the public sewer. Spills can also occur along the sewer lines from blockage of the lines, structural defeats from tree roots, or flooding. In some cities of the world with combined sewer systems, heavy rains can cause flooding of the sewer system, resulting in sewage seepage into the environment. Another point where spills can occur is at sewage or wastewater treatment plants, possibly the result of flooding or process failures within the plants.

Health and Environmental Effects of Spills

Sewage spills can cause serious health effects when humans are exposed. Sewage carries various disease-causing organisms (pathogens) that are dangerous to human health. The common pathogens found in sewage include viruses, bacteria, fungi, and parasites like cryptosporidium. The pathogens are usually transmitted through ingestion, hand-to-mouth route, and can survive on surfaces for many days. Sewage-borne pathogens can cause a host of diseases, such as the following:

- *Bacteria:* Cholera, typhoid fever, diarrhea, cramps, tetanus, and leptospirosis. The typical bacteria that are sewage-borne are cholera, *E. coli*, salmonella, typhoid, and shigellosis.
- *Viruses:* Hepatitis A, which can cause yellowing of the eyes and skin, inflammation of the liver, and jaundice. Rotavirus can cause fever, vomiting, and diarrhea.
- *Fungi:* Aspergillus, which can cause lung infections and other respiratory illnesses.
- *Parasite:* Cryptosporidium can cause diarrhea, nausea, and fever. This can be fatal in some cases, especially when found in drinking water.

Other illnesses that can be caused by exposure to sewage include skin infections, asthma from inhalation of living or dead microorganisms, and, in rare cases, inflammation of the lungs.

In addition to the risk associated with the biological agents in sewage, chemical agents present in sewage, such as hydrogen sulfide gas, pesticides, toxins, carcinogens, endocrine-disrupting chemicals, and pharmaceuticals, can cause health problem when humans are exposed.

Sewage spills also cause pollution of both land and water. When sewage enters a river or waterway, it kills fish and a host of other aquatic organisms as a result of reduced oxygen levels or from direct toxicity. It reduces the water quality and can lead to growth of algae blooms, causing eutrophication.

Managing Sewage Spills and Cleanup

Sewage spills can spread very rapidly, especially during floods, so it is important to effectively deal with spills with urgency to minimize the risk of exposure to sewage. Where sewage spill is extensive, there may be a need to evacuate people from the affected areas, especially children and pets. There should be a proper mechanism for alerting people in the affected areas. The alerts should include any public health or environmental concerns and safety precautions that should be taken by the public. Where rivers or waterways have been affected, there should be alerts for no swimming. In the United States alone, 1.8 to 3.5 million people fall sick annually as a result of swimming in sewage-contaminated waters. Where people's homes are exposed, affected houses and furniture in serious spill cases should be professionally cleaned. Food items packed in paper or cardboard and home-canned foods should be disposed of, as well as loose and unpacked foods such as fruits and potatoes. Industrially canned food can still be used but must be properly washed with detergent, rinsed in plenty of clean water, and boiled for 10 to 15 minutes where it is safe to do so. Alternatively, they can be soaked in a solution of bleach for 15 to 20 minutes.

In the case of a sewage spill caused by flooding, it is advisable to get professional cleaners to help with cleaning of contaminated houses and apartments. Saturated walls, carpets, and upholstered furniture should be removed for disposal or professional cleaning. During sewage spills caused by flooding, potable water sources are affected. Responsible authorities should provide advice to the population on what can be done with respect to accessing potable water. Drinking tap water should be avoided, and where that is inevitable, the water should be boiled before drinking.

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See Also: Chemical Risk; Cholera; Environmental Contamination; Freshwater Demands and Shortages.

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Shelter-in-Place

Shelter-in-place is a term for emergency management short-term, nonevacuation strategies to protect community residents' health and safety. The purpose of shelter-in-place as an emergency response action is to protect people from exposure to contaminated air or at least to lower the risk of people's exposure to contaminated air. Shelter-in-place means selecting a small, interior room with no or few windows and taking refuge there, such as at home, at work, at school, or in some other safe place in order to protect oneself from a crisis event or other dangerous incidents. If a person cannot shelter inside a building, sheltering inside a parked vehicle with the ventilation system turned off is a safer alternative than remaining outdoors.

People might need to shelter-in-place when chemical, biological, or radiological contaminants may be released accidentally or intentionally into the environment. Sheltering in place is the normal mode to be utilized during an emergency, and there are two modes through which shelter-in-place offers protections. First, lower peak indoor concentrations compared to outdoor concentrations are encountered after a short-term release because building structures limit indoor-outdoor air exchange. Second, sheltering may reduce cumulative exposures through one or more mechanisms, including transformations of toxic chemicals on building surfaces and time-dependent manipulation of ventilation rates.

Residents of an affected community might be informed that shelter-in-place is being implemented through the traditional and new media, including social media platforms, Emergency Alert System, warning sirens, Reverse 911, and National Oceanic and Atmospheric Administration (NOAA) weather reports. In the United States, facilities such as nuclear power plants are required to be equipped with audio alert systems that can be heard within a 10-mile (16-kilometer) radius.

For example, in a chemical supply chain chemical release, local officials provide guidance on shelter-in-place and/or evacuation. Preexisting public warning systems that issue shelter-in-place or evacuation directives reduce negative consequences. Deciding whether to evacuate part of a community or to shelter-in-place is one of the most important questions in emergency management that is often made in urgency and under pressure. Shelter-in-place is a fundamental component of emergency preparedness, and knowing shelter allocations and resources availability helps emergency management officials make a more informed decision to direct the public to evacuate or to shelter-in-place.

Most people in the United States had not heard of the term *shelter-in-place* until the September 11, 2001, attacks on New York and the Pentagon. Many wrongly consider the term to mean "drive to a shelter." Shelter-in-place is a relatively new protective action, and there are numerous cases where shelter-in-place has been successfully used. For example, in the case of 70 tons of liquefied chlorine released in Henderson, Nevada, on May 6, 1991, research showed that people who sheltered in place were exposed to a much lower risk of being contaminated than people who were evacuated.

Officials make the decision to shelter-in-place when reasonable assurances are presented that moving people out of their current residence, business, or school will put their health and safety in risk more than allowing them to stay in place. Several factors are considered when deciding the effectiveness of a protective action such as shelter-in-place. These include but are not limited to public education and preparedness, response time for all parties, chemical characteristics, release time, weather and meteorological conditions, and population density. Among them, public education and preparedness is very important. If publics are not properly informed and are not part of community dialogue about the hazards and options that they can choose to protect themselves, their short-term safety and long-term health will be put at risk.

There are numerous aspects to how to shelter-in-place, depending on location. For example, at home, following recommendations of the U.S. Department of Homeland Security, people at risk should do the following: (1) close and lock all windows and exterior doors, and close the window shades, blinds, or curtains if there is a danger of explosion; (2) turn off all fans, heating and air conditioning systems, as well as close the fireplace damper; (3) have a family disaster supplies kit and make sure the radio is working; (4) go to an interior room without windows—in the case of a chemical threat, an above-ground location is preferable because some chemicals are heavier than air and may seep into basements even if the windows are closed; (5) include pets and be sure to bring additional food and water supplies for them; (6) ideally, have a hard-wired telephone in the selected room—cellular telephone equipment may be overwhelmed or damaged during an emergency; (7) use duct tape and plastic sheeting (heavier than food wrap) to seal all cracks around the door and any vents into the room; and (8) keep listening to the radio or television or new media technology platform until told all is safe or told to evacuate. A typical shelter-in-place kit should include, but not be limited to, masking tape (2–3 inches wide), plastic film or sheets, towels or sheets for sealing under the doors, battery-powered radio and extra batteries, flashlight and extra batteries, and bottled water or access to running water.

Public Education Is the Key

Industrial complexes help prepare the community for what to do if a chemical emergency occurs, and public education is the key. For example, the Wally Wise Guy program is taken into elementary schools to teach the concept of shelter-in-place. This shelter-in-place program uses a Wally Wise Guy turtle, a costume-character mascot, to bring home the message that it's wise to go inside his shell whenever there's danger. This kids-targeted public education program is linked to adults in the community—who learn from the kids. Wally is targeted to reach children from kindergarten to fourth grade, so Wally makes personal appearances at elementary schools, day care centers, community parades, sporting events, and other civic events. Wally also has his own collection of marketing tools, including pens, mouse pads, screensavers, blogs, bags, and other promotional items with his name and shelter-in-place information. Outreach comprises industry volunteers, nongovernmental agencies, emergency services personnel, concerned citizens, and chemical manufacturing groups. The Community Education Task Force, a consortium of local emergency planning committees (LEPCs), along the Houston Ship Channel, developed Wally, which has expanded to more than 106 member organizations in 25 states.

In conclusion, shelter-in-place is a relatively straightforward and quick emergency action plan to implement because of the sudden and unanticipated nature of chemical releases or other incidents and crises. Instructions to shelter-in-place are usually provided for durations of a few hours, not days or weeks. The effectiveness of shelter-in-place can depend upon multiple factors, including release condition, the quantity emitted, toxicity of the chemical, release duration, and atmospheric transport and dispersion. Likewise, building characteristics, such as leakiness of the building envelope and the interactions between the toxic chemicals and building surfaces, also affect the result. Besides these, human factors play an important role as well; for example, delay in notification and response, the timing of shelter termination, and the knowledge of community residents to enact appropriate shelter-in-place behaviors.

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See Also: Chemical Risk; Civil Protection; Cosmology Episode; Crisis Communications; Emergency Public Information; Evacuation; Mass Care; Pre-Crisis Training and Planning; Preparedness; Protection; Public Awareness and Education; Terrorism.

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Sigma (Swiss Re)

Sigma is a series of research reports on the insurance industry published by Swiss Re, a large reinsurance company based in Switzerland. Several editions are released each year. A report dealing with catastrophic events impacting the insurance industry is published annually. This report is based on a privately held database the company maintains that can be subscribed to. These reports indicate which portions of losses were insured losses. Certain criteria must be met for an event to qualify as the kind of major loss included in the study. The annual report on catastrophic events is widely viewed as authoritative and is widely cited. Insurance companies may base many important decisions on the projections and findings of these reports.

Swiss Re is the second-largest reinsurance company in the world. Reinsurance is the process by which insurance companies contract with other insurance companies to share in potential losses. Reinsurance is particularly important in insuring that catastrophic events do not impact single insurance companies in a manner that would put them at risk for default.

Swiss Re was founded in 1863 and is headquartered in Zurich, Switzerland. The company was founded after a large fire proved that there were no adequate insurance provisions for these kinds of losses. The company has offices in over 20 countries. Swiss Re was one of the main insurers of the World Trade Center in New York City in 2001. The company is widely diversified. In 2011, Swiss Re was named China Reinsurer of the Year, indicating the role the company plays on the international scene.

In 2005, Swiss Re acquired the U.S. reinsurance company General Electric Insurance Solutions for $7.4 billion. This move greatly expanded the company’s U.S. presence.

Swiss Re has maintained the Sigma database since the 1970s. It is a limited-access database of natural and human-made disasters available only to subscribers. Approximately 300 new disasters are added to the database each year. Sigma requires that one of a number of criteria be met for a disaster to be added to the database. Among the marks for inclusion are at least 20 deaths, 2,000 made homeless, or insured losses more than $14 million. The monetary thresholds are adjusted for inflation on a yearly basis. Sigma gives all losses for an occurrence in U.S. dollars based on the exchange rate at the end of the year. To adjust for inflation, the dollar values are figured using the U.S. Consumer Price Index.

Swiss Re publishes a number of Sigma studies each year. The name of the publication comes from the Greek letter, which has several important functions in math, including a designation for risk, a primary concern of the insurance industry. Recent issues of Sigma include:

- Understanding profitability in life insurance
- Natural catastrophes and human-made disasters in 2011: historic losses surface from record earthquakes and floods
- Microinsurance: risk protection for 4 billion people
- World insurance in 2008: life premiums fall in the industrialized countries, strong growth in the emerging economies
- Scenario analysis in insurance
- Insurance in the emerging markets: overview and prospects for Islamic insurance

Sigma studies give analysis of economic issues as well as reporting on issues in insurance, reinsurance, and other financial services. Sigma is published in English, German, French, Spanish, Italian, Japanese, and Chinese. Seven to nine studies are published each year in the Sigma series. It comes in print and online versions.

Of prime importance for crisis management, each year one issue of the Sigma series presents data related to catastrophic events and risks over the past year, with some outlook on the future. The report on natural and human-made disasters occurring in 2011 revealed that the economic losses from these events were the highest in history. The economic losses were $370 billion, with insured losses totaling $116 billion. The events included the highest insured earthquake losses, with the earthquakes in Japan, New Zealand, and Turkey. Australia and Thailand suffered great floods with losses of property and life. Insured losses for the year were the second highest in history.

The Swiss Re Web site gives extensive access to Sigma reports in the form of podcasts giving summaries of yearly catastrophic events. Though much of the data on disasters is considered proprietary by Swiss Re, the company's Web site is a rich source of information that can be freely accessed.

The sources of data on disasters are not released by Sigma. It is thought that data are gathered from newspapers, insurance periodicals, specialist publications, online reports, other insurers, geographic and geologic sources, and direct market contacts.

The Sigma report on the losses of 2011 noted that the losses that year reflected an increase in risk. This was noted to be especially true in emerging markets. It was also noted that flooding showed a lack of good flood hazard information. The report indicated that Swiss Re will update its flood hazard information to give the insurance industry a clearer picture of the risk of losses from floods. This information could be used by insurance companies to make decisions about coverages and policy rates. Data for 2011 differed from 2009 in that in 2009, Sigma reported that catastrophes claimed fewer lives and that insured losses were down from the previous year. Sigma reported that despite historic insured losses, the insurance industry weathered the losses with no undue burden on the industry as a whole. The massive tornado season in the United States was noted, as well as the milder-than-normal U.S. hurricane season.

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See Also: All-Hazards; Blizzards; Bureau for Crisis Prevention and Recovery, UN (UNDP–BCPR); Catastrophe, Definition of; Disaster, Definition of; Earthquakes; Floods; Hurricanes, Typhoons, and Cyclones; Risk Analysis; Risk Assessment; Tornadoes and Severe Thunderstorms; Tsunamis; Wildfire.

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Simulations

Preparation is one of the most important tools a leader has during a time of crisis. In order for a person or an organization to realize how prepared they are for any given crisis, a test of the crisis management plan needs to occur. One of the best ways to test a crisis management plan, the leadership, and the team members is through an active simulation. A simulation is an activity that gives participants the opportunity to go through a real-life scenario in which they test their actual skills, plans, and resources in a setting that is similar to what they would experience during an actual crisis. If designed correctly, a very good simulation will test every aspect of the crisis management plan.

Too often in the past, crisis management plans were created on paper and stored in a gigantic binder in someone's office, seldom looked at and even less likely discussed. It possibly may have been reviewed once a year or looked at, before annual weather seasons such as hurricane, blizzard, or tornado season. When an actual crisis occurred, it was too late or too cumbersome to utilize, with numbers on the contact list being out of date, people changing positions, or information impossible to find. In order for a crisis management plan to be properly utilized, the plan needs to be routinely tested. Simulations provide the best opportunity to provide that test of the plan.

Simulations can be designed to meet the needs of the participants. It can focus on general practices or on a particular crisis scenario. Simulations can be used to test policies and procedures and team readiness, build relationships, establish resources, and look for holes and discrepancies in the plan. The simulations need to be designed to give the participants a realistic understanding of what they may actually experience during a genuine crisis. These crisis simulations will provide the team members actual experiences dealing with a crisis. When an actual crisis occurs it will most likely not go exactly as it did in the simulation, but by preparing for a crisis through practice simulations, the crisis responders should be better prepared for the situation.

Pre-Crisis Prevention and Planning Phase

It has become important to crisis managers to properly utilize the planning options of the pre-crisis phase of the crisis mitigation cycle. Avoiding or preventing a crisis is one of the most important steps a crisis manager can undertake. During this stage, a crisis manager will research and design a plan that, it is hoped, will put the organization in the best possible position to deal with a future incident. If it has undergone a previous crisis where it has completed an extensive evaluation in the post-crisis phase, it will be able to adopt the suggestions and recommendations for their crisis plan. These experiences can be utilized in the creation of the simulation.

Developing the simulation for use in the planning phase will provide opportunities to train crisis team leaders, members of the community, and other stakeholders in the proper procedures for handling a crisis. Preventive measures taken during the planning stages will allow the crisis managers to become more familiar with resources available to them in human and fiscal capital and to identify other resources at their disposal.

Continuous training in crisis management has become imperative to the successful operation of a crisis management plan. Through the training process, team members become familiar with possible crisis scenarios, strengthen team cohesion, improve performance speeds, and assist with stress management. By using simulations in the educational learning environment of the training process, team members get a chance to deal with the uncertainty, threats, and other issues, such as communications or resource allocation, that occur in an actual crisis. Through the simulations, policies and procedures can be tested, personnel can be identified who need to be added to the team or prioritized in the contact list, vulnerabilities can be identified, organizational structures and relationships can be evaluated, and credibility with stakeholders who are aware of the tests can be increased. Crisis team members can be assessed from their simulation

A responder surveys a simulated accident scene to quickly assess and triage potential survivors during training at the Center for Domestic Preparedness (CDP) at its Chemical, Ordnance, Biological, and Radiological Training Facility in Anniston, Alabama, August 5, 2011. The CDP offers the only program in the nation featuring civilian training exercises in a true toxic environment that uses real chemical agents. The advanced, hands-on training enables responders to effectively respond to real-world incidents.

performance and can learn from the experience to better perform during an actual crisis.

For crisis management training and evaluation, simulations can take many forms. The two most common and useful of these simulations to those working with crisis management are tabletop exercises and full simulations.

Tabletop Exercises

For cost-effectiveness, tabletop exercises are often the most practical way to host a simulation for many crisis management administrators. Tabletop exercises are designed to bring together the people who would be involved in handling a crisis through a discussion-based platform. Often done through simple "paper and pencil" methods around a table or in a conference room, a crisis scenario or case study is created, detailing the particulars of the incident. The participants then examine and discuss the details of the scenario, deciding how they would handle the crisis. Through this process, the participants are able to test their plan; discover flaws, vulnerabilities, or oversights in the plan; and correlate and connect individuals or departments to specific activities if a crisis were to occur. Tabletop exercises entail very low stress and allow for corrections to be made in the plan through the process. If there is a need for a correction, the tabletop exercise can be paused and the policy or procedure changed.

Tabletop exercises can be very beneficial for training. They can serve as ways to acclimate new team members, create team cohesion, and hone skills of veterans. Tabletop exercises have the flexibility to be as simplistic or complex as the user needs them to be. They can be designed to be a brief walkthrough at the end of a staff meeting for an individual department, or they can have a very detailed design involving members of the organization, community members, and stakeholders.

Full Simulations

Full simulations are opportunities for an organization to fully test its crisis management plan. In a full simulation, participants act as if an actual crisis were occurring, managing posts, responding in person, and truly testing the actual execution of a crisis plan. In a full simulation, many people and resources are involved. Personnel include those in the organization, possible "actors" or participants to represent the victims or bystanders to the events, outside agencies that may be involved and called into service, and often outside evaluators to critique the execution of the operation.

Hosting a full simulation offers the benefit of allowing a more accurate test of the command structure and operation of the crisis management plan. If a mistake is made or a resource is not available, the participants have to navigate the situation and cannot pause to correct the mistake or try a different plan of action. If there are any discrepancies or flaws in the plan, they are identified and the participants are tested on whether they can devise a successful substitute or alternative. Although the participants know that it is a simulation and there is less pressure on them than during a real crisis, the experience still makes them more prepared, and the familiarity of choices will benefit them in an actual crisis.

Full simulations provide an excellent opportunity to test personnel on the crisis management team. Even though the participants know that it is not an actual crisis, their stress levels are elevated compared to a tabletop exercise. In the full simulations, there are opportunities for the team members to build and strengthen their cohesiveness with each other as they mimic the situations in the field or in the command center.

Full simulations require a lot more planning and coordination in the creation of the scenario. Participants need to be notified in advance. If there is role-playing involved, such as possible victims, the actors need to be trained in advance. Outside agencies need to be notified and coordinated with if they participate in the event or if they need to be aware that it is happening. In order to make sure an actual panic does not occur, if a full simulation may be witnessed by the organization's community or general bystanders, proper notice of the full simulation needs to be given through the media and other communication methods. The public needs to know that this is just a simulation and that an actual crisis is not occurring. A full simulation also involves more financial costs than a tabletop exercise because of the expenditure of actual resources through the simulation, and it also takes more time to plan and to organize the event.

Simulation Design

In order for simulations to be successful, proper planning and design needs to occur. Specific goals need to be created by the crisis management team, and possible crises need to be evaluated that could occur to the organization. Planners should utilize a conceptual model such as the crisis matrix described by E. L. Zdziarski, J. M. Rollo, and N. W. Dunkel. This model is designed to triangulate between level of crisis, types of crisis, and intentionality of crisis. The levels of crisis can be designated as a critical incident (often involving one person or a small group), an organizational emergency (impacts everyone in the organization but is contained within the organization), and disaster (full-scale disruption that affects the organization and the community). The types of crisis are linked into environmental, facility, and human crises. Finally, intentionality of the crisis is categorized as intentional and unintentional.

Planners of simulations can devise possible scenarios by choosing from one aspect of each category of the crisis matrix. For example, a chosen crisis could be a critical incident, human crisis, and intentional. The crisis manager then would devise a simulation around this, such as a person being shot intentionally by a former coworker. The crisis manager could devise different simulations for each of the possible combinations of level of crisis, type of crisis, and intentionality that relate to the type of incidents the organization may face. The team members can then practice these simulations to become familiar with the execution of that particular type of plan. When a real crisis occurs, by relating it back to the design of the matrix, they can utilize and substitute as necessary but will have the foundation needed to facilitate dealing with the crisis to the best of their ability.

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See Also: Agency Notification and Mobilization; All-Hazards; Alternate Site, Corporate; Backup Facility; Civil Protection; Collaboration; Command

Case Study: Campus Shooting Simulation

Since the shootings at Virginia Tech and Northern Illinois, many college campuses have hosted active shooter simulations to test their readiness for such an event on their campus. In these simulations, the crisis management plans, crisis administrators, students, faculty, staff, and local agencies are tested to see how they would respond if a shooter were to choose their campus for such atrocious actions.

After recent rises in campus shootings such as one in California, a community college in the southeast decided to run a crisis simulation to test its readiness. An active shooter scenario was designed and implemented in order for the institution and outside evaluators to observe the response. The college coordinated with community officials and with a dozen police and emergency agencies in the planning of the event. The simulation was chosen to take place during the institution's spring break to minimize the disruption of classes and the impact on students, and proper media notice was given to those in the community to make them aware that only a simulation was taking place.

The simulation was carried out on campus, and data were gathered to evaluate the response of the institution and the agencies. They found quickly that the actions occurred very rapidly and that decisions also had to be made quickly, along with the handling of a barrage of outside phone calls that tied up key personnel who needed to be handling other aspects of the situation. Communication and coordination issues stood out during the simulation as areas of concern.

In the post-evaluation process, the institution looked at data from outside evaluators along with discussion of their own experiences. The data were evaluated to see what they did correctly and also what they could improve. It became apparent that they needed to modify and change how they responded to students, especially interaction with students through the Internet.

By hosting a full-scale campus shooting simulation, this community college was able to evaluate its crisis plan within the institution while also testing its readiness in case an actual shooter were to come on campus. Even though this simulation was planned out in advance and administrators were not surprised that it was happening, the crisis administrators were still able to learn from the experience. Even being aware of having an active shooter simulation on campus, giving a chance for preparation, there were still flaws and failures in the system. If a real crisis were to occur, there would be additional burdens from the added stress of surprise, but by hosting a simulation, the institution hoped to be one step closer to being prepared.

and Control; Contingency Planning; Coordination; Crisis Communications; Crisis Simulations; Critical Applications; Critical Infrastructure; Decision Making; Decision Making, Theories of; Decision Making Under Stress; Disaster Drills; Emergency Management Agencies, City and County; Emergency Manager; Emergency Operations Center; Exercises; Groupthink; Hazard Mitigation; Incident Management; Logistics; Operational Plans; Political and Organizational Leadership; Pre-Crisis Training and Planning; Preparedness; Prevention; Response Team; Risk Analysis; Risk Assessment; Scenario Planning; Situational Analysis; Strategic Plans; Training; Volunteer Coordination; Vulnerability.

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Situational Analysis

Situational analysis is a business strategic management-planning tool that has been usefully adapted to the field of crisis management. Situational analysis identifies and evaluates the unique state of the environment and circumstances within which a person, organization, or program is operating and how these elements interact with one another in both the present and the future. Situational analysis is used in both the planning and response phases of crisis management. Its use results in an effective crisis management plan and response that considers the dynamic, complex nature of crises and the need for adaptability in crisis management and response, and it allows organizations to learn from past crises and mitigate future crises.

Crisis Management Planning

Situational analysis in crisis management planning is useful for both crisis avoidance and crisis mitigation and is a vital beginning to the process of developing a thorough and effective crisis response plan. Two key considerations to identify in crisis management planning are the threats to the organization posed by potential crises and the opportunities for action and improvement posed by potential crises. Organizations that can benefit from crisis-management-based situational analysis include businesses, nonprofits, governments, first responders, emergency response units, families, and individuals.

Situational analysis aids in the development of crisis management plans with clearly defined statements of purpose, objectives, strategies, and criteria for success while also helping to ensure that the right tools, personnel, and procedures are in place. Both internal and external factors are equally considered within a situational analysis. The process involves analyzing the state of the organization, including its internal strengths and weaknesses, as well as its external threats and opportunities. It also identifies objectives and strategies for their implementation in a variety of fields.

Organizations select emergency planners or crisis management teams to identify and mitigate potential crises and develop an organizational crisis management plan. These teams may consist of a representative selection of relevant personnel, such as employees, board members, volunteers, donors, and outside actors. They conduct extensive research, analysis, testing, review, and revisions to create effective emergency response plans. Their considerations include likely types of crises, likely primary and secondary impacts of these crises, and internal and external conditions that may impact crises and organizational response.

The foundation of a crisis management plan consists of the mission statement, goals and objectives, and strategies for implementation. A crisis management plan's objectives can be established prior to the situational analysis and adapted according to its findings, or the objectives could be established upon completion of the situational analysis to ensure their compatibility with its findings. Both methods are commonly in use and bring their own strengths and weaknesses. Some crisis managers prefer the former method because the mission and objectives will be in line with the organization's present situation and history. Other crisis managers prefer the latter method because it provides greater opportunity for formulating a new vision that is not unduly influenced by the organization's present situation and history.

SWOT Analysis

The strategic business and organizational planning method known as a SWOT (strengths, weaknesses, opportunities, and threats) analysis (or SLOT analysis), developed by Albert Humphrey during the 1960s and 1970s, is a useful business-planning tool that has been widely adapted to any decision-making process in which there are clearly identifiable objectives. It is commonly adapted for use in crisis management prevention, planning, and preparation. Although SWOT analysis is one of the most common components of situational analysis, other methods are sometimes employed as an alternative to or in tandem with a SWOT analysis. An enterprise-virtual representation (EVR) analysis focuses on how organizations environmentally adapt to situations and has also been found useful in crisis management.

A SWOT analysis seeks to identify and evaluate a potential project's strengths, weaknesses (limitations), opportunities, and threats by gathering thorough information for each of these target categories. The use of SWOT analysis in crisis management emphasizes the identification of vulnerabilities and threats as well as the evaluation of the plausibility and seriousness of identified vulnerabilities and threats. Important considerations include the possible effects of a potential crisis and the potential costs to the organization and its services, assets, image, personnel, and other identified relevant factors. SWOT analysis also focuses on the identification of possible ways to mitigate or minimize these effects.

An organization's strengths and weaknesses are considered internal factors, while opportunities and threats are considered external factors. The analysis of strengths and weaknesses determines those internal factors that provide an advantage or disadvantage over other organizations or projects, while the analysis of opportunities and threats determines the external factors that could enhance or diminish an organization's or project's performance. Internal factors are under the organization's more immediate ability to control, while external factors require an organization to respond. SWOT analysis results are often in matrix form. A SWOT or other form of analysis then provides a solid foundation on which to conclude the larger situational analysis and develop an effective crisis management plan.

Areas of Consideration

The first areas of consideration generally focus on the crisis management plan's goals and scope of coverage, as well as the delineation of what constitutes a crisis and when the plan should be implemented. Crisis managers, like strategic business planners, often first conduct an analysis to determine the state of the organization or a performance review. A situational analysis would then seek to identify and evaluate those factors relevant to crisis management as well as the relationships among those factors.

Internal and external factors to consider relevant to crisis management include personnel (employees and volunteers) and other potential actors; finances and other resources; technical capacity and potential for development; legislation; economic, social, and political climates; and community relations. The determination of which factors are relevant and critical in crisis management are variable between types of organizations and crises.

Another important category of consideration involves the human impacts of potential crises. Employee and volunteer availability, responsibilities, reporting procedures, and contact information are examples of internal human impact variables, while customer, client, or community groups' needs and accessibility and the availability of outside help are examples of external human impact variables. Situational analysis aids in the establishment of a clear chain of command that accounts for various contingencies when designated leadership may be compromised, as well as clear directives for when and how outside personnel resources should be sought if internal crisis management resources are overwhelmed.

Communication is yet another vital area of situational analysis in crisis management planning. Internal and external communications managers and spokespeople should be identified for the various crisis scenarios under consideration, and access to various categories of information and means of communicating that information should be determined. Examples of key information include the place and time for assembling the crisis management team, the work and emergency responsibilities of employees and other relevant actors in various crisis situations, and the availability of services or facilities.

Objectives for effective communication include the dissemination of clear and accurate information as needed to employees, outside authorities, and the general public; the prevention of unnecessary panic; and the minimization or elimination of rumors, exaggerations, and other forms of misinformation. This is especially vital in crises that engender widespread public attention and receive widespread media coverage. Effective situational analysis and adaptation can also avoid public incidents of blame as people seek scapegoats in the face of disasters or other crises.

Technological considerations may focus on the state of an organization's technological resources and plans for technological growth and the potential emergence of new technologies in the field. The crisis management team may also identify those technological or other physical elements essential to the implementation of emergency response or the resumption of normal operations. The proximity, availability, and technological capacities of outside private, volunteer, or governmental emergency response resources are also generally considered.

Examples of physical and geographical considerations are the location of the organization and its constituency, the area's infrastructure and resources, and the prevalence and types of natural disasters in that area. Local, national, or international political, economic, and sociocultural situations and the identification of any contentious issues may also come into play. Examples include legislative, regulatory, or other government actions and publicity surrounding industry issues or failed industry oversight or conditions that led to previous crises.

An effective crisis management plan must foremost be flexible and adaptable in the face of the dynamic nature of both the internal and external factors identified through situational analysis and of the crises themselves. Situational analysis helps plan for the varying response levels necessary to meet the varying magnitudes of potential crises as well as establishing a clear determination and procedure for the involvement of external resources or organizations when deemed necessary under various scenarios.

Allowances for adaptability, as well as periodic review, updating, and revision, will ensure the flexibility of a crisis management plan. Emergency drills, simulations, and field exercises are common methods of evaluating crisis management procedures before their use in an actual crisis. The need for an adaptable, flexible crisis management plan that minimizes the potential impact of crises can also be achieved through the thorough consideration of a variety of potential crisis scenarios. The inclusion of contingency plans identified through situational analysis is another method of increasing flexibility.

Crisis Management Response

Situational analysis is critical not only to effective crisis management planning, but also to effective crisis management response during crisis situations. The general crisis management response procedures developed during the planning stage need to be evaluated, supplemented, and adapted to meet the unique situational aspects of individual crises. Ineffective or nonexistent situational analysis can contribute to poor management of a crisis, often exacerbating the situation.

Crisis managers need to rationally analyze the situation and determine if it constitutes a crisis, determine the scope and nature of the crisis, and guide an effective and positive response. Situational analysis is a critical step in the process of developing an understanding of how to best respond to various crisis situations. Crisis managers also use situational analysis in the determination of when to safely begin rescue and relief operations and/or when to resume normal business operations.

The management of information flow is a vital component of real-time crisis management. Ongoing real-time situational analysis allows involved personnel to remain fully informed as a crisis unfolds and crisis conditions may change. An internal communications manager should be identified to inform internal actors as needed to ensure worker safety, provide clear knowledge of when and where to report in various situations, and counteract any misinformation or rumors. Ongoing situational analysis also aids in the effective implementation of contingency plans, such as chain of command when a crisis response leader is unavailable or calls for outside agencies or resources when local resources are overwhelmed

Levels of public knowledge and public interest in an unfolding crisis are another critical variable that can be identified through real-time situational analysis. The management of information flow's impact on public opinion as related to the company or program and its handling of the current situation can be critical to successful crisis response as well as the successful resolution of related legal and public image issues that may arise after the crisis has passed. An organization spokesperson should be identified and available throughout a crisis to serve as a public face and provide proactive, clear, and accurate information as necessary.

Actual crises are directly impacted by the local conditions and the sometimes unpredictable, always dynamic, and dangerous nature of crisis situations. These conditions often challenge even the strongest crisis management plans. Emergency responders may be forced by local conditions to deviate from the formal crisis management procedures developed during the planning stage if they are to provide an effective emergency response. Over time, these deviations may become standard local practice not reflected in the formal organizational crisis management plan. The slow separation between established written crisis management procedures developed by a crisis management team or emergency planners and those procedures employed by emergency response personnel or crisis management team members during actual crises is defined as practical drift.

Taking situational analysis into account and building in flexibility in the face of the dynamic, localized nature of crises when developing crisis management plans are important components in the avoidance of practical drift and its impact on actual crisis response. Planning considerations include the most likely crisis scenarios, the most likely primary and secondary impacts, the level and capabilities of available resources and emergency responders, and the implementation and coordination of a multiagency response. Practical drift and emergency response delays are less likely when emergency responders have a flexible crisis management plan that combines expert planning knowledge with local conditions as their guideline.

The value of situational analysis extends beyond the crisis management planning and response phases. After a crisis has passed and normal operations have been restored, the evaluation of the crisis situation and response often continues as organizations or governments seek to learn from the past crisis and improve planning and response for the next crisis. Situational analyses conducted during this post-crisis period can identify early warning signs of the impending crisis that were either missed or recognized too late to aid in better future detection. It can also identify any contributing weaknesses that either were not detected or not recognized as contributing factors.

The success of post-crisis situational analysis depends on the establishment of open and accurate communication as well as avoidance of rushing to hastily drawn conclusions and the desire to place blame. Questions to consider generally include the effectiveness of all phases of the crisis response, whether the formal crisis management plan was implemented and to what extent, what adaptations or deviations were necessary and why, and the identification of responses that could or should be improved. All internal and external personnel should be consulted in an open atmosphere without fear of punitive action in order to honestly gauge overall and individual performances. The result will be a revised and strengthened crisis management plan and a thorough record that will help in the ongoing goal of avoiding or mitigating future crises.

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See Also: Business Continuity Planning; Business Impact Analysis; Business Resumption Planning; Practical Drift; Strategic Plans.

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Smallpox

Although the World Health Organization (WHO) has officially declared that the world is clear of active cases of the historical disease of smallpox, it is still important to be prepared. Smallpox is a viral and highly contagious disease. Its high infectivity, fatality, and universal lack of immunity make it a potential threat to both national and international public health.

Definition and History of Smallpox

Smallpox is a viral disease caused by the variola virus, a member of the family poxviruses. The disease is strictly transmitted from human to human—no animal reservoir is known for smallpox. Infected persons show no symptoms for seven to 17 days, which is the usual incubation period. During this period, the infected person cannot transmit the disease to others. This period is followed by symptoms of the disease, the most important of which is fever, which is followed by a rash two or three days later. During this stage, the ill person becomes highly infective to others. Transmission of the virus occurs mainly through the respiratory route by infected droplets, or aerosols, from ill persons. Transmission through infected materials, such as bedsheets or blankets, is possible but to a lesser extent than face-to-face transmission. An ill person can be considered noninfective only after the falling of the last scab off the body.

Severity of symptoms differs among persons, depending on many factors like previous immunity to the disease. Two main types of clinical presentation of the disease are known: Variola major and Variola minor. Other forms may present but are less likely. The origin of the smallpox virus can be traced back in history. Its bad reputation as a devastating disease is the result of its fatal consequences on the affected population. It has killed millions throughout history, and nothing could be done for ill persons or their contacts until Edward Jenner developed a vaccine in 1798.

In 1967 the World Health Organization (WHO) started an intensified eradication program to eliminate smallpox from the world. In 1977, the last naturally occurring case was reported in Somalia. In 1979, the WHO confirmed the global eradication of smallpox, and in 1980 the WHO declared officially the eradication of smallpox.

The smallpox virus is kept in only two WHO collaborating centers in the world: one in the United States and one in the Russian Federation. It could not be confirmed whether there is any other stock kept illegally in other parts of the world. Keeping the WHO stock is mandatory for research purposes. Destruction of other stockpiles of the virus came in response to the international fear of using variola virus in illegal acts like bioterrorism. However, there is still fear of creating the virus through advanced biological techniques.

Significance of Smallpox

Smallpox is included in the core list of the Australian Group (an informal group of states aiming at impeding the spread of biological and chemical weapons) and the Centers for Disease Control and Prevention (CDC) list of agents that pose a threat to public health.

This enlistment is supported by some factors that make preparedness for smallpox a worthwhile activity. These factors rely mainly on the historical picture of this devastating disease that has killed millions throughout history, the high infectivity of the virus, and the current lack of immunity to the disease by most individuals all over the world. Besides, all the information known to date about the disease has been extracted mainly from studying periods in which universal immunity to the disease existed. Therefore, it is expected that if the disease emerges, it will be more virulent, and consequences of its spread could not be estimated on a confirmed basis. Also, the spread of decreased immunity as a result of various diseases, especially AIDS, makes more persons vulnerable to dangerous complications of such a disease in case it appears again.

Treatment and Preparedness

To date, there is no definite treatment for smallpox. The only intervention known to be effective is vaccination. Vaccination of infected persons in the early stage may prevent some symptoms or lessen some consequences of the disease. Duration of the immunological protection after vaccination is debatable, but generally it is 10 years or more. The smallpox vaccination has its own complications that vary in severity. Because of the complications of the vaccination, it should be administered when justified and its expected benefits outweigh probable complications. As of 2012, there were some antiviral drugs undergoing laboratory investigations to study their efficacy on the orthopoxvirus family.

Smallpox as a potential threat to international public health mandates some sort of preparedness nationally and internationally. A smallpox reemergence in the current world, with decreased or no immunity to the disease plus easy travel, means a unique crisis with unexpected consequences. Continuous debate exists over how far the world should be prepared. One point of view sees that there is no need to hold a large stockpile of vaccine for a disease that is not present in active form. On the other hand, fear of reemergence of smallpox, especially through bioterrorism, occupies the minds of large numbers of researchers and decision makers. Preparedness on the national level should at least assure familiarity of public health professionals and medical practitioners with the disease early and the needed information to diagnose the disease and deal with it. Early detection of the disease is relatively easy to the trained clinician because of the characteristic rash of the disease. Early detection, prompt isolation, and vaccination are the three pillars of effective containment of disease spread.

Internationally, the WHO keeps a stockpile of the vaccine in case of reemergence of the disease. In addition, the WHO continuously holds committees to follow the latest research about the virus and medications under development.

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See Also: Biological Weapons; Cholera; Emergency Medicine; Public Health Surveillance.

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Smog

The term *smog* was originally coined to describe a combination of smoke and fog. Today, the description has expanded to include a mixture of noxious gases and particulate matter formed when sunlight interacts with anthropogenic air pollutants, usually under higher temperatures. This is better described as "photochemical smog" among the global scientific community. It is a negative consequence of industrialization and our modern-day lifestyle.

The principal component of photochemical smog is anomalous concentrations of ground-level ozone, which is formed when anthropogenic pollutants (mainly nitrogen oxides) react with reactive organic compounds in the presence of sunlight. Photochemical smog can also be made up of a host of other compounds including nitrogen dioxide, nitric acids, aldehydes, particulate organic and inorganic nitrates, and peroxyacetyle nitrate. Nitrous oxides and the reactive organic compounds are precursors of ozone, the main smog constituent. Ozone is a naturally occurring atmospheric gas that is present in high concentrations in the stratospheric ozone layer, where its presence is critical in protecting the Earth from too much ultraviolet radiation. It is also present at ground levels, with normal atmospheric concentrations ranging from 15 to 35 parts per billion in nonpolluted areas. High concentrations at ground level cause photochemical smog, which is a serious pollution problem and sometimes characterized by atmospheric haze and accompanying health effects.

Industrial emissions and vehicular exhaust emissions are the main sources of nitrogen oxides and reactive organic chemicals. They are emitted into the atmosphere from natural sources like wildfires, lightning, bacterial action, and vegetation, and from anthropogenic sources like emissions from power generation, jet engines, motor vehicles, incineration, fuel evaporation, solvent usage, and other industrial processes. The reactions between these pollutants to form photochemical smog take place in high temperatures in the presence of sunlight; hence, photochemical smog is common on hot, sunny days.

Health Effects of Smog

Smog constituents, particularly ozone, have both serious health and environmental effects. The health effects of exposure include respiratory illnesses such as cough, dryness of the throat, and deep painful breathing, and, in some cases, it may result in tissue injuries deep in the lungs and premature aging of the lungs. There are also a host of other effects, such as irritation from particulates. There is a high risk of exposure for children and adults with preexisting respiratory disease such as asthma and bronchitis. Heat and humidity, which occur alongside smog, have a synergistic effect in increasing the stress on the cardio-respiratory systems.

Environmental Effects

Photochemical smog has serious environmental effects on plants and animals. Pollution levels of ozone in the atmosphere cause significant adverse effects to horticultural crops, forest trees, and annual plants. Annual plants such as spinach and tomatoes are highly responsive to elevated concentrations of ozone. It causes dead patterns on the upper surfaces of leaves of trees and causes reduction in the rate of photosynthesis, water use efficiency, drought tolerance, leaf area, and flowering rates. Photochemical smog also affects various materials, including plastics, metals, concrete, and paintworks. Ozone is a strong oxidizer and can chemically attack some of these materials. Paintings, rubber, and coating deteriorate very quickly when exposed to pollution levels of ozone and other photochemical smog constituents.

Smog pollutes the urban sky, as the sun sets over Connaught Place in Delhi, India. In many parts of south Asia, a rapid increase in air pollution from burning fossil fuels and biomass has worsened winter smog and extended its duration.

Managing Smog Crisis

Photochemical smog occurs in various regions of the world, particularly in highly industrialized areas, given enough sunlight, high temperature, and sufficient concentrations of the precursor pollutants. The lower-latitude areas are more prone to smog crisis, though higher latitudes are also at risk during long summer days. Although smog is common in urban cities, it not restricted to them only, as smog and its precursors can travel considerable distances away from the urban pollutant source regions. Although the smoggiest cities in the world are in developing and emerging nations like China and Mexico, smog is a problem that affects both the developed and developing nations. Smog crisis has been experienced in various cities in the United States, such as Los Angeles, but also in London, Vancouver, and many other cities across the continents.

In managing the consequences of smog episodes in any city or region, there is need for effective smog alert mechanisms. As in most parts of the world where weather alerts are used to warn people of extreme weather events like flooding, smog alerts should be issued by designated national or regional authorities targeted at the general population. The alerts should be accompanied by medical health advice on the potential risk associated with exposure to the constituents of photochemical smog. The general public should be advised to take precautionary measures to safeguard against ill health effects of exposure.

The most vulnerable populations should avoid strenuous activities and limit outdoor activities during smog episodes. Where avoidance is not feasible, outdoor activities should be planned for early mornings or late evenings, when the concentrations of photochemical smog constituents are considerably lower. People are advised to stay in well-ventilated or air-conditioned environments. They should also drink plenty of fluids to avoid dehydration. Where there are symptoms of ill health, medical attention should be sought.

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See Also: Chemical Risk; Climate Change Adaptation; Crisis Communications.

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Social Distancing

Social distancing is a method of avoiding disease and contamination that is spread by contact with and close proximity to other people. Although the proven method of quarantine is the strict separation of both diseased and undiseased, or contaminated and uncontaminated, social distancing can be used to continue to perform needed functions while offering some protection against the spread of disease and contamination. Crisis management can call for the use of social distancing in risk mitigation, but the use of social distancing in the crisis management command center can cause some communication problems. In the end, social distancing is a good method to avoid disease and contamination.

Common Uses of Social Distancing

At the beginning of every cold and flu season, the recommendations are repeated: wash hands before touching the face or food, cough and sneeze into shirt sleeves, use hand-drying paper towels to open the bathroom door, and if possible, keep illness at home or wear a mask. Many germs and contaminants are spread through the air in minute exhaled water droplets and transfer from hands to surfaces that others touch and thus continue the transfer and spread. The best way to avoid spread is quarantine, but social distancing can be used to great effect while still allowing people to function in various settings with others.

Staying Home and Use of Hygiene

A more severe form of social distancing is actually not going to the usual places where people gather for unnecessary social events. People may decide to watch or listen to a church service on TV or radio to avoid the close congregation of people. They may wish a relative a happy birthday with a phone call rather than a visit. A social network site may be used to talk with a friend rather than meeting at a place where germs and contaminants may be. Although these are the most effective means to distance oneself from disease and contaminants, often they are not accepted for places like work and home. Lesser forms of social distancing involve going to places where people congregate for various reasons and keeping a greater distance from those around you—at least three feet.

Good hygiene plays an important role. Colds and other exhaled germs and contaminants can be inhaled directly or fall onto surfaces where they can transfer to others by touch. On average, we touch our face thousands of times each day, transferring whatever happened to be on our hands to our face, eyes, or mouth. Avoiding touching surfaces or wearing latex gloves can keep contaminants from transferring to the hands and then to the face. Food should be prepackaged by known uncontaminated sources, such as at home, or be packaged prior to any known general contamination. It is helpful to eat wrapped foods without touching the food itself with one's hands. Other preventive steps include drinking from a covered container, not handling cash or coins that may be contaminated, using credit or debit cards, and not obtaining cash from machines or banks. Avoid having things delivered to the home or protected areas, and leave anything delivered to sit untouched for at least 24 hours.

Keeping a distance of at least three feet from others who cough or sneeze or admit to being sick can help. Wearing masks is good, but they should really be worn by the sick, as masks prevent exhaled particulates from escaping into the air and falling on surfaces. Surgical masks offer some protection, but a full hood offers the best protection because it covers not only the mouth and nose but also the eyes, which are another point of entry to the body's systems. Health professionals' use of masks as a prevention measure has not been proven effective, but it also hasn't been proven harmful, so if one must go to a place where there will be many people in an enclosed area, a mask might help. Anyone outside one's group should not be let into one's home or other protected areas. If an outside repair person must enter a protected group area, all other members of that protected area should go to another protected area until the repair is over and the areas contacted by the repair person are decontaminated.

Trusted Groups

Another strategy can be to form social distancing groups that promise to help each other by performing activities that protect themselves and their group, thus forming a trusted group. Group members admit when they've been exposed to protect others in their group and wait the expected incubation period before having close contact with any group members. One person in the group may shop at the packed grocery store for the entire group, limiting the number of exposures of the group. If a child contracts the flu, a trusted group member who has already been infected could care for the infected child, keeping the original house and people free from infection. The group members work to protect each other by helping with daily activities and isolating themselves should they become contaminated.

Organizations and Government

Organizations may choose to enact some social distancing strategies by canceling events, closing schools, rescheduling events, limiting attendance at events to only those directly involved, and limiting or suspending use of mass transit.

Governments are working with nongovernment organizations to prepare everyone for possible implementation of social distancing strategies. Personal preparedness is one of the main needs of social distancing activities so that people can be prepared. Schedules of supply purchases can help people stock up on supplies; the buy-one-more program instructs people to get what they need and then buy just one item more so it can be stockpiled.

The Elderly

Social distancing for elderly and disabled persons presents a very complex situation that can only be addressed by multiple contingencies to care for them. The social distancing group strategy helps with this, and with many levels of support, a social distancing concept using groups from business, government, and faith-based organizations can help keep the elderly and disabled safer.

Crisis Management

The crisis management command center can also institute the need for social distancing. It is important for the key people managing the crisis to avoid disease and contamination, making social distancing a viable practice. The use of technology can aid in social distancing while keeping key people informed and active in the crisis. Phones, intercoms, and the Internet can all help maintain communication while people are kept apart.

Conclusion

In conclusion, social distancing can help people avoid disease and contamination that is spread by contact with and close proximity to other people. Quarantine is a severe form of social distancing that is used under conditions of widespread contamination. Social distancing facilitates the continuation of work and required activities while offering some protection against the spread of disease and contamination. Crisis management calls for the use of social distancing under the proper circumstances. Overall, social distancing is a good method to avoid disease and contamination.

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See Also: Biological Engineering Risk; Centers for Disease Control and Prevention (CDC); Drug Resistance; Ebola Virus; Epidemics; Health and Medical Response Scenarios; Influenza; Pandemics; Quarantine.

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Social Media

Social media have emerged as a popular and powerful tool that empowers the public to engage in effective communications before, during, and after crises. The rise in popularity and availability of social media, in tandem with events like the Virginia Tech shooting in 2007, the H1N1 outbreaks in 2009, the Haiti earthquake in 2010, the Japanese earthquake and tsunami in 2011, and hurricanes Irene and Lee in 2011, illustrate the usefulness of social media as a powerful tool that enables individuals to share information from anywhere and at any time.

Throughout these events, social media were used, first by the public and increasingly by response organizations, to organize volunteer efforts, to solicit resources and donations, to locate missing children and lost loved ones, to share and ask for information, to collaborate, and much more. These events were captured, in real time, through videos, photos, texts, Tweets, and profile updates and comments sent from the field and shared across the Internet, often before the stories broke via traditional media. As technology and communications trends advance, so too do the opportunities to leverage social media for crisis management. Each event illustrates the momentum with which the public, technology developers, government agencies, and response organizations must adapt in order to harness the power of social media, the possibilities of which are exponential.

A Paradigm Shift

In April 2007, a gunman shot and killed 33 students over the course of several hours at Virginia Tech. Before the gunman had stopped shooting, students were sharing information via text messages, instant messenger, blogs, radio, Facebook, and phone as the university's Web site crashed in a surge of online activity. In the absence of official information, confusion regarding the identity of the shooter, the identities of the wounded, and the number of students who had been killed ensued. For several hours, the only communication and information sharing occurred via several social media channels, without authentication from official sources.

Following the tragedy at Virginia Tech, social media began to gain traction as a meaningful communications channel in emergencies, first by the public and the media, and then increasingly by response organizations. Social media applications in crisis management continue to advance, illustrated in several events since the shootings at Virginia Tech.

In 2009, public health officials feared a large-scale influenza epidemic as H1N1 cases were reported across the globe. While traditional methods of disease tracking and information sharing were used, social media became a critical element in both the dissemination of H1N1-related information and the enhancement of surveillance for early detection of outbreaks. The Centers for Disease Control and Prevention (CDC) quickly became a leader in leveraging social media tools like blogs, widgets, video, online badges, RSS, and podcasts for a variety of purposes, working with the Department of Health and Human Services to create tools in a variety of formats and languages to provide consumers and partners with credible, science-based information, like the availability of flu shots, personal hygiene, and disease reporting.

Google.Org and InSTEDD developed Google Flu Trends to monitor key words inputted into Google Search throughout the world—specifically aggregating key words relating to H1N1 and flu-like symptoms. Google found that certain search terms were good indicators of flu activity and therefore leveraged the technology to aggregate Google search data to estimate potential flu activity. They found they were able to maintain better situational awareness earlier than was provided by traditional surveillance methods.

Following the 7.0-magnitude earthquake in Haiti on January 12, 2010, individuals, volunteer organizations, and response agencies shared information from the ground via SMS, Facebook, and Twitter. Ushahidi, an open source software platform used for information collection, visualization, and interactive mapping, set up a map to capture information reported from the island. Volunteers helped capture information via SMS and through social media channels like Twitter, translating, vetting, and mapping the information. The National Institutes of Health developed blogs, widgets, and text messaging campaigns to raise money in various languages, including Creole, English, and Spanish. Google developed the Haiti Earthquake People Locator, an interactive Web site where individuals could post and search for information about found or missing persons.

In response to the devastation of the Haiti earthquake, the American Red Cross launched a text donation campaign. Partnering with cell providers to enable individuals to text “HAITI” to 90999 to donate $10 to the American Red Cross relief and recovery work in Haiti, the Red Cross set a standard for future disaster relief efforts across the globe.

On March 11, 2011, a 9.0-magnitude earthquake hit Japan, triggering a tsunami of devastating proportions and nuclear crisis. As individuals shared information across the ocean, agencies rushed to provide accurate messaging relating to a variety of health and public safety concerns. The CDC embedded badges and buttons on several Web sites and encouraged placement on individuals’ profiles to provide information on radiation poisoning. Social media were also used in the United States to issue tsunami alerts and warnings and evacuation information by agencies like the Pacific, West Coast, and Alaska Tsunami Centers via Web sites, RSS, YouTube, Twitter, Facebook, and other channels.

In the fall of 2011, government agencies, nonprofit and volunteer organizations, and private-industry technology developers collaborated to support the planning for and response to Hurricane Irene and Tropical Storm Lee, two storms that caused severe flooding up and down the east coast of the United States. Volunteers developed vetted lists of official response agency Twitter profiles. The American Red Cross trained digital volunteers, provided with digital verification badges from Twitter, to monitor and provide updates via a variety of social media channels. New York City shared preparedness information like flood zone warnings and evacuation information via Facebook, Twitter, YouTube, and Web site widgets.

The Florida Department of Emergency Management, in partnership with the Department of Homeland Security Science and Technology Directorate, created a Web service that aggregated the data from the Twitter list and mapped the location of the each profile geospatially. The result enabled response organizations from every state on the eastern seaboard to view, sort, search, and analyze the information from within their native mapping environments.

Changing Expectations

In the aftermath of Hurricane Katrina, displaced Gulf Coast residents searched for loved ones online, looking through hundreds of Web sites, blogs, and social networking platforms, posting messages and hoping that friends and family might find them amid a disorganized sea of virtual information. Since Katrina, social media have exploded in popularity and application, advanced by innovation and creativity born from the public's changing expectations for quicker and more robust response times and the need for greater government transparency. However, while the public has embraced social media as a meaningful tool for communications and collaboration during emergencies, response organizations have been hesitant to do so for a variety of reasons, including privacy, data ownership, security, rumor control, accountability, validity and accuracy of information, resources, and risk management concerns. Despite these concerns, however, response organizations are beginning to realize the impact social media have on crisis management and are increasingly turning to social media to share and search for information and connect with citizens and partners during all phases of a crisis.

The public's changing expectations have pushed response organizations to discuss best practices and lessons learned in the hope of developing standards and guidance for the use of social media for public safety and crisis management, as illustrated by a slew of events beginning in 2010.

In August 2010, the American Red Cross hosted the Emergency Social Data Summit, a gathering of leaders and experts from government, private, nonprofit, and response organizations, to discuss how to leverage social media in disasters. At the summit, Red Cross leadership announced a survey conducted earlier in the year to gauge the public's expectations regarding the use of social media by response organizations during a disaster. The survey found that while the Internet was the third most popular method for people to gather information during a disaster, after television and radio, one-fourth preferred social media to let their loved ones know they are safe. A majority of those surveyed also believed response organizations should regularly monitor social media, and 39 percent expected help to arrive in less than one hour if a request was posted to social media. The survey illustrated the public's changing expectations and suggested that response organizations need to adopt and develop social media as a standard to enhance traditional response methods.

In late 2010, a group of individuals interested in the use of social media for emergency management began exploring best practices and sharing lessons learned. Using Twitter as a tool to organize and host ongoing discussions, the group established the hashtag #SMEM (social media and emergency management) as a beacon to identify the ongoing exchange of ideas in the hope of framing policy development and to accelerate the adoption and integration of social media into traditional emergency management efforts.

The group was invited by the National Emergency Management Association (NEMA) to develop a social media summit to be held at the end of the association's biannual conference in Washington, D.C., in March 2011. During this event, emergency management, social media, volunteer, and nonprofit leaders met to discuss the role of social media in emergency response and to identify and develop best practices, challenges, possible applications, training opportunities, and future development possibilities.

Following the success of the conference, Senator Mark L. Pryor (D-AR) invited a panel of response and social media experts to testify before the Understanding the Power of Social Media as a Communications Tool in the Aftermath of Disasters hearing held by the Senate Committee on Homeland Security and Governmental Affairs, Subcommittee on Disaster Recovery and Intergovernmental Affairs in May 2011. In his testimony, Administrator Craig Fugate of the Federal Emergency Management Agency (FEMA) shared his thoughts on the importance of social media as a tool to engage and empower the community and as a means to "quickly and specifically share information with state and local governments as well as the public."

In June 2011, the International Association of Emergency Managers (IAEM) USA board approved the formation of a new cross-disciplinary workgroup under the IAEM-USA committee structure called the Emerging Technologies in Emergency Management Ad Hoc Committee (ETEM), which focuses on the role of technology in emergency management, including social media and other Web-based systems.

The Way Ahead

The collaboration, innovation, and hard work of the community have pushed the acceptance and adoption of social media as a standard in crisis management and disaster response. Social media are increasingly used for a variety of purposes, including mitigation and preparedness, for the following:

- Education, training, and community building
- Surveillance and situational awareness: to monitor, aggregate, visualize, and identify trends
- Correcting misinformation: to identify and respond to misinformation and rumors quickly and to empower the community to participate in the conversation and to ensure the accuracy of information shared
- Alerts and notifications: to augment traditional communications channels used for alerts and warnings
- Recovery and resilience: to empower the community to engage in ongoing communications and collaboration and to participate in recovery and preparedness efforts

This fact is also illustrated by the American Red Cross, which on March 7, 2012, announced the launch of a Digital Operations Center (DOC), the first social media–based operation devoted specifically to humanitarian relief. In a press release and a summit attended by multiple leaders of the disaster response and relief community, the Red Cross also announced the development of a digital volunteer program in support of the center's operations, where volunteers from across the country will be trained to respond online to questions from the public, distribute critical information, and provide comfort and reassurance during emergencies. Information collected by the digital volunteers will also help the Red Cross to identify trends in needs and to better connect and allocate resources to those who need them the most.

Partnerships and collaboration efforts of individuals and groups across the response community like Project Epic, Crisis Commons and Crisis Mappers, Humanity Road, Exercise 24, members of the #SMEM community who developed a Virtual Operations Support Team model for leveraging of digital volunteers in an operational capacity, the Department of Homeland Security Science and Technology Virtual Social Media Working Group, and many more help advance the use of social media for crisis management and emergency response. In addition, the continued advancement and proliferation of social media technology and mobile technology enable real-time "field engagement," providing responders with the ability to find and share data directly from the scene of an event, which may result in better decision making and resource allocation, and, ultimately, faster recovery.

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See Also: Crisis Communications; Mass Media; News Media.

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Spaceflight

Still in its infancy, spaceflight is a high-risk endeavor that is constantly evolving and experiences leaps and setbacks. Although it is considered experimental flight by some, the broad tax-paying publics of many nations show little tolerance for the failures, deaths, and setbacks associated with spaceflight. Critics often will ask whether time, effort, and money devoted to spaceflight might be put toward social projects. Two well-known U.S. spaceflight crises have contributed to an increasingly negative public perception of the National Aeronautics and Space Administration (NASA) and allowed some to question the agency's ability to perform its mission successfully.

Challenger and *Columbia*

The space shuttle *Challenger* and *Columbia* disasters were involved in the two major spaceflight accidents in U.S. history. These missions not only caused astronaut fatalities but also raised worldwide concerns for engineering crisis prevention and decision management.

On January 28, 1986, the space shuttle *Challenger*, on Mission STS-51-L operated by NASA (the 25th flight of the American space shuttle program and the 10th flight of the *Challenger*), broke apart 73 seconds after liftoff from Kennedy Space Center in Florida. All seven crew members died as a result of inadequate escape systems after the explosion, including Christa McAuliffe, a celebrity as the first astronaut of the NASA Teacher in Space Project. The launch was broadcast live and drew significant nationwide attention. This disaster caused the first multiple in-flight fatalities in the United States, leading to the suspension of the shuttle program for 32 months.

Then-U.S. President Ronald Reagan appointed the Rogers Commission to investigate the accident. Analysis showed the technical attribution to a faulty O-ring sealing the aft field joint on the right solid rocket booster (SRB). The cold weather, with a temperature below 53 degrees F (12 degrees C) on the launch day, caused the dysfunction of the O-rings, which allowed pressurized hot gases to leak from the SRBs, resulting in the structural failure of the external tank and the disintegration of the entire vehicle. The investigation further pointed out the flawed organizational culture and decision-making processes of NASA as the root of the disaster and made nine recommendations for safety improvements in the space shuttle program. In response to the recommendations, NASA redesigned the SRB and established the Office of Safety Reliability and Quality Assurance for management decision making. However, the space shuttle *Columbia* disaster in 2003 reflected that NASA had failed to fully learn from the *Challenger*.

As the second space shuttle NASA had lost in 17 years, *Columbia* disintegrated during atmospheric reentry after the 16-day Mission STS-107 (the 28th flight of the shuttle program) on

February 1, 2003. The loss of communication and tracking of the vehicle occurred 16 minutes before scheduled landing at an altitude of about 203,000 feet over Texas and Louisiana. No survivors were found among the seven astronauts on board. According to the Columbia Accident Investigation Board (CAIB), the catastrophe was rooted in both technical and organizational issues. The structural breakup was determined to have been caused by the damage of the thermal protection system in the left wing; the leading edge of the left wing was struck by a briefcase-sized piece of foam insulating material from the external tank early in the launch, which, however, NASA ignored for further inspection. This disaster delayed the space shuttle flight operations for over two years, including the construction of the International Space Station. Both of the space shuttle disasters were criticized for the flawed decision-making process.

International Space Crises

The main nation-actors in manned spaceflight are the United States, Russia (former Soviet Union), and China. Engineering defects and flawed decision-making processes would also cause non-astronaut fatalities and losses. In February 15, 1996, the Long March rocket with the Intelsat 708 Satellite operated by Intelsat, a communications satellite services provider, veered off course immediately after launch, causing fatalities in a village near the Xichang Satellite Launch Center at Xichang, People's Republic of China. The accident raised a dispute over the nature and extent of the damage, as well as an international political controversy.

All Soviet-era space missions and current Russian missions revolve around the Baikonur Cosmodrome, the world's first and largest space launch facility. Several historic spaceflights centered from the Cosmodrome, including the launch of *Sputnik 1* and *Sputnik 2* (the first to carry a living animal, a dog named Laika), the first manned orbital flight, and the first woman to be involved in spaceflight. The Cosmodrome is located in the republic of Kazakhstan. This is also where the one and only flight of the Russian space shuttle *Buran* occurred. In 2002, a collapse of the hangar that housed the *Buran* killed eight workers and destroyed the only Soviet shuttle.

Space Law and Safety Standards

Commercial spaceflight ventures and space tourism are currently closer to reality than ever before. Virgin Galactic is by far the most publicized commercial space venture. With spaceflight still in its experimental stages, the future is uncertain. Advocates claim space tourism will create cheaper, safer, and more efficient development of spaceflight technologies, however, public confidence in commercial spaceflight is yet untested.

Spaceflight and legislation still focus heavily on nation-states as actors. Under international space law, a nation-state ultimately retains jurisdiction and control over space objects on its registry and is charged with authorizing and exercising continuing supervision over its national space activities; therefore, it is to be held responsible for any disasters caused by spaceflight originating from its source. However, crisis management techniques are varied and not standardized in private spaceflight. Although international space law addresses issues of liability, spaceflights are not regulated. Most crisis management plans in the private spaceflight industry (specifically, space tourism) revolve around liability and insurance coverage. Appropriate insurance coverage is essential for licensing.

However, insurance coverage is not standardized with regards to issues of personal liability, passenger liability, third-party liability, and ancillary coverage. Without agreed-upon issues of insurance coverage and liability under international space and air law, the creation of crisis management plans has been relatively inconsistent between actors or has been absent altogether, leaving a gap that requires future research and debate.

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See Also: Air Traffic; Coupling; Decision Making; Decision Making, Theories of; High Reliability Organization Theory; Impact Analysis; Interdependence; Normal Accident Theory; Normalization of Deviance; Organizational Failure; Public Image; Structural Secrecy.

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Spokesperson, Designating and Utilizing

A spokesperson represents and speaks for an organization or entity. Early literature on crisis management encouraged the use of a single spokesperson to provide consistency and avoid confusion. The modern view encourages the designation of multiple spokespersons who speak with one voice in the midst of a crisis. All potential crisis spokespersons should be members of the crisis management team and be prepared to develop and deliver a core organizational message. In addition to the core message, designated spokespersons also answer questions specific to their area of expertise but should be careful not to contradict the core message or the messages of other spokespersons. Maintaining a consistent organizational voice, regardless of the number of spokespersons used, is paramount in maintaining organizational credibility in a crisis.

Designating Spokespersons

Traditionally, the primary spokesperson for an organization or entity has been the most senior public relations representative or communication specialist. The press secretary for the president of the United States is a prime example of that position. However, since no person can be available at all times, even the primary spokesperson should have a backup in place who is equally adept at handling media requests for information. The primary and backup spokespersons should also trade off on who is the 24-hour emergency contact for the media so someone is always available to respond. Both individuals should have the authority to enact the crisis management plan. Ideally, the plan is enacted and spokespersons are prepared to respond before the media call. Stereotypical judgments that public relations representatives are trained to lie and spin details have deterred media outlets from wanting to quote these primary spokespersons in media coverage of a crisis event. Thus, while the public relations representative or communications specialist will likely be the first point of contact, he or she must work with the crisis management team to develop the core organizational message and then designate and train additional spokespersons to deliver that message.

For large events, and particularly in crises, the chief executive officer (CEO), president, or highest-ranking official of an organization or entity is expected to make a statement and respond to media inquiries. Designating the organizational leader as the primary spokesperson in a crisis demonstrates the seriousness with which an organization or entity is handling a crisis. However, rising to the position of CEO is often not based on an individual’s public speaking skills. Although communication is essential in any leadership role, chief executive officers are considered effective if they increase the bottom line, be it through improving product quality, cutting costs, or expertly aligning mergers and acquisitions. Being able to respond quickly and accurately to a barrage of media inquiries in a crisis is rarely part of the job description. Crisis case studies have repeatedly shown that the effectiveness of an organizational leader’s crisis communication can alleviate or exacerbate the effects of a crisis. Organizational leaders should therefore have extensive media training.

Additional spokespersons are needed to provide expert information in particular crises. For example, if the crisis involves a product failure, the director of quality control or most senior engineer could potentially answer specific questions as to why the product failed and what procedures are being put in place to ensure a similar crisis does not happen in the future. These subject matter experts can serve as spokespersons by providing detailed information, specific to their area of expertise, while still supporting the core organizational message. However, to do that, these individuals must be part of the crisis management team and be trained to work with the media. In practice, the CEO may present the official statement by the organization in a press conference and then direct media questions toward subject matter experts who can answer questions specific to their department or area of expertise.

In addition to designating spokespersons based on expertise, research has shown that individuals believe spokespersons who look similar to them and share their cultural beliefs are more credible. Everett Rogers's research on diffusion of innovation and information supports this notion by demonstrating the importance of opinion leader homophily in encouraging adoption of a message. Especially in crises that present physical harm to publics, having spokespersons or community liaisons who can provide instructional messages for self-protection to racial and ethnic minority populations is key to reaching diverse publics often most vulnerable to the effects of crises. Language barriers must also be considered. If organizations and entities operate in areas where multiple languages are spoken, spokespersons should be designated who can not only translate the core message but also respond to specific cultural concerns.

A major benefit of providing the media with multiple spokespersons—from human resources representatives to product line managers—is that statements from multiple sources assist the media in adding depth to their coverage of the crisis without seeking comments from outside individuals who may not have the most accurate information and are likely not privy to the core organizational message or trained to work with the media. Organizations and entities should have policies in place to discourage organizational members from communicating with the media without official designation as a spokesperson and proper media training. Designating and utilizing multiple spokespersons requires consistent and constant training and interview practice to enhance qualities of effective spokespersons.

Qualities of Effective Spokespersons

Effective spokespersons are trained to demonstrate specific qualities. Most importantly, spokespersons need to appear pleasant on camera. This does not mean individuals need to be good-looking but that they appear credible and kind. Spokespersons must look confident and present information with confidence to demonstrate that they have control over the crisis. At the same time, spokespersons must be able to show compassion for those adversely affected by the crisis. Confidence and compassion are delivered through engaging eye contact, facial expressions, hand gestures, and tone variation.

An example of contrasting spokesperson qualities was evident in the Ford/Firestone crisis on September 6, 2000, when CEOs for both companies testified before Congress. The lack of facial expression and tentative monotone responses from Bridgestone/Firestone CEO Masatoshi Ono compared to the scripted delivery of Ford CEO Jacques Nasser left Firestone looking incompetent and Ford looking arrogant. Although both companies suffered considerable financial losses because of the crisis, Nasser's display of confidence, while lacking compassion, still overshadowed Ono's seemingly embarrassed attempt to deny full responsibility while simultaneously admitting some tires were faulty. Ono was replaced as CEO of United States–based Firestone the following month.

Spokespersons must also be able to respond to questions confidently. Research has shown the public believes individuals who respond to questions with "no comment" are either hiding something or are ignorant about the answer. In practice, the gap in the news story not filled by a spokesperson's comment is filled by the comments of another source, typically not one affiliated with the organization. By not responding to questions, spokespersons allow the gap to potentially be filled with inaccurate or negative information.

Hesitations in responding to questions, such as frequent disfluencies ("um," "like," "uh") also demonstrate a lack of confidence and make the spokesperson appear uncomfortable and unprepared. For example, Caroline Kennedy's 2009 bid for Hillary Clinton's vacated U.S. Senate seat in New York ended almost before it began after a series of media interviews demonstrated her high speaking anxiety and verbal tic of adding "you know" into her responses an average of 10 times per minute. Although politicians often have press secretaries, since they represent their constituents,

President Barack Obama (center, right) and other White House staff meet with BP executives in the Roosevelt Room of the White House, June 16, 2010, to discuss the BP oil spill in the Gulf of Mexico. BP CEO Tony Hayward (left, foreground), under intense pressure, made a series of spokesperson blunders during the crisis that turned the public against him: making comments about his own difficulties, making references to caring for the "little people," and repeatedly pleading the Fifth Amendment during congressional hearings.

they must also speak on behalf of the constituents. Kennedy withdrew her name shortly after pundits began counting her verbal tics in each interview.

While confidence demonstrates control, showing compassion demonstrates a spokesperson is kind. Responses that are overly scientific or stated in anger can appear callous and cold to publics. Training spokespersons to speak in layperson terms becomes particularly challenging when working with subject matter experts. Subject matter experts are typically used to speaking in acronyms and area-specific jargon. In their day-to-day jobs, these experts do not need to explain the intricate details of their position requirements to individuals outside the circle of colleagues who speak the same language. Overly jargon-laden and scientific language can sound condescending and create confusion. The goal of crisis communication should always be to increase clarity and decrease confusion.

In 1996, U.S. Department of Agriculture (USDA) official William Hueston appeared on the Oprah Winfrey show to respond to claims by the Humane Society's "Eating With Conscience" campaign on mad cow disease. The only statements by Hueston that appeared on the show were of him referring to mad cow disease as bovine spongiform encephalopathy, or BSE. Although "mad cow disease" is not an appealing label, the scientific jargon used to describe the condition did not increase clarity in the crisis and created the perception that the USDA was hiding behind big words. So much outrage was induced by Winfrey saying she was "stopped cold from eating another burger" that beef markets plummeted to 10-year lows and a group of Texas cattle ranchers sued Winfrey's production company for defamation of beef. Hueston received additional criticism for his long-winded responses during the trial, where he was also a witness for the plaintiffs. Hueston claimed most of his comments explaining the safety of American beef were cut out of the episode, while Winfrey producers argued the comments were cut because they were exceedingly critical of all other guests.

To show compassion, spokespersons must also maintain a calm composure in the midst of heated questions. In 2010, in the midst of the British Petroleum Deepwater Horizon disaster and ensuing oil leak, primary spokesperson and CEO Tony Hayward committed a series of spokesperson errors that made BP's expressions of compassion and regret questionable. Although not his intent, statements such as "I'd like my life back" and

BP cares for the "little people" made Hayward appear callous. Both of these statements were said during grueling interviews that were undoubtedly frustrating for Hayward. However, maintaining composure and not lashing out in anger during interviews is a spokesperson quality that must be developed. Hayward later sealed his reputation as a dishonest leader attempting to hide BP's grave offenses when he repeatedly pleaded the Fifth Amendment in Congressional hearings when asked to explain what led to the initial explosion in June 2010. Hayward was replaced as CEO and primary spokesperson by the end of July 2010.

Spokespersons must be trained to exude confidence and compassion throughout their communication. Delivery cues such as engaging eye contact, facial expressions, hand gestures, and tone variation, as well as essential dos and don'ts like responding calmly and clearly without hesitation and scientific jargon, can assist spokespersons in providing an effective crisis response.

Utilizing Spokespersons

The primary duty of spokespersons in a crisis is to develop the organization's or entity's crisis response message. This message must be clear and concise and represent the organization's goals and values. Members of the crisis management team, and particularly spokespersons, should be involved in the creation of this message to ensure all perspectives of the crisis management team support the organizational message. Spokesperson duties may then include delivering speeches or statements, responding to media inquiries, conducting interviews, appearing on talk shows, and testifying in court or before Congress. A more recent duty of spokespersons is posting statements and responding to other posts on social media.

For example, in 2009, Domino's Pizza had to respond to a YouTube video of two employees implying that they contaminated the ingredients used in the pizzas and sandwiches they prepared and sold. Domino's was hesitant to respond publicly at first, not wanting to draw additional attention to the video, and concentrated efforts on locating, firing, and having police apprehend the culprits. However, when views of the YouTube video reached one million and consumer perceptions of Domino's food quality shifted from overwhelmingly positive to negative, Domino's had to respond. Dressed in a shirt with an open collar, Domino's USA president, Patrick Doyle, read a two-minute crisis response seated in front of a single camera. The statement was straightforward and apologetic and identified the strategies used to ensure incidents like the one depicted in the video will not happen again. In addition to Doyle's YouTube response, he was also the voice behind the Domino's @dpzinfo Twitter account. This account, separate from the company's usual Twitter account (@dominos), solely addressed issues and questions surrounding the crisis. The tweets delivered by Doyle were informal and thanked customers for their support. Although Doyle's seemingly casual look and reading of the quickly prepared script were still criticized, by the time the story reached mainstream media, it had shifted from food contamination to how companies can protect themselves in the YouTube era. Following the crisis, Doyle became the primary spokesperson of Domino's, conducting interviews and appearing in television commercials.

Regardless of the number of spokespersons designated, their official positions within the organization, or in which venue they are utilized, all spokespersons must be trained to speak effectively with one voice. Contradictory, confusing, and poorly executed communication exacerbates a crisis. Not everyone has the qualities needed to be an effective spokesperson; therefore, careful consideration is needed to determine whom to designate and how to train them to best assist the organization in meeting its goals while addressing the uncertainty of the crisis for affected publics.

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See Also: Crisis Communications; Emergency Manager; Emergency Public Information; Mass Media; News Media; Public Image; Public Relations; Reputational Risk; Social Media.

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Stafford Act

The Stafford Act is formally known as the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law [P.L.] 101-707, 42 U.S.C. 5121-5206) of 1988 as amended from the Disaster Relief Act of 1974 (P.L. 93-288) and its implementing regulations (44 C.F.R. 206.31-206.48). The Stafford Act is federal law providing statutory authority for the federal response and relief to local and state emergencies and/or disasters occurring in the United States. The Stafford Act specifies how an emergency or disaster is declared, how federal assistance is provided, and how state and local governments should plan for emergencies or disasters, and it outlines state and local governments’ responsibilities to citizens. Federal resources under the Stafford Act are meant to supplement state and local resources for recovery efforts, as opposed to providing all financial and physical support. Under the Stafford Act, the Federal Emergency Management Agency (FEMA) is responsible for coordinating, arranging, and disseminating relief to federally declared emergencies or disasters.

History of the Stafford Act

The Stafford Act is established on approximately 50 years of federal legislation. Prior to 1950, Congress approved funding for disaster events on a case-by-case basis. In 1950, Congress enacted the Federal Disaster Relief Act (P.L. 81-875), which was designed to standardize the federal government assistance process and focused entirely on disaster response. The Federal Disaster Relief Act was not meant to supersede state programs but to provide additional assistance. Since local governments were unable to fully recover from major disasters, Congress passed the Disaster Relief Act of 1966 (P.L. 89-769) and restructured existing legislation to include recovery efforts. The Disaster Relief Act of 1974 (P.L. 93-288) outlined the procedures for a president to make a disaster declaration.

President Jimmy Carter in 1979 issued Executive Orders 12127 and 12148. Executive Order 12127 created the Federal Emergency Management Agency (FEMA), and Executive Order 12148 reorganized several organizations (civil defense, federal preparedness, hazard and earthquake reduction, and disaster assistance) under FEMA. Executive Orders 12127 and 12148 gave FEMA authority over the federal government’s preparation, mitigation, response, and recovery to emergencies or major disasters. Several years after the creation of FEMA, Congress ordered a study/review of existing disaster programs and requested a clarification of the federal government’s authority over nonmajor disasters. The resulting legislation was the Stafford Act of 1988, which amended the Disaster Relief Act of 1974.

The Stafford Act was amended in 2000, with the Disaster Mitigation Act (P.L. 106-390). The Disaster Mitigation Act repealed FEMA’s historical ad hoc response and recovery focus and implemented mitigation requirements that focused on reducing losses for state, local, and tribal governments. This act also emphasized state, local, and tribal governments’ planning, risk assessment, leadership, and training as a condition of receiving federal assistance. With the passage of the Homeland Security Act of 2002, FEMA was incorporated under the Department of Homeland Security Emergency Preparedness and Response Directorate. In 2006, Congress passed the Post-Katrina Emergency Management Reform Act (PKEMRA; P.L. 109-295), which renovated federal-level preparedness and management of disasters. Also in 2006, Congress amended the Stafford Act with the passage of the Pets Evacuation and Transportation Standards Act (PETS Act; P.L. 109-308). This act, as a condition of receiving federal assistance, mandates state and local governments' residential evacuation plans include plans for the evacuees' household pets and service animals.

The Seven Sections of the Stafford Act

The Stafford Act is made up of seven sections (Title SI–VII). The first section, Title I, focuses on the declaration process and the definitions of an emergency and a major disaster. Under the Stafford Act, the president has the authority to declare an emergency or a disaster. The process is the following: a governor must make a formal request to the president for a declaration. Prior to a governor's making such a request, the governor has to take the appropriate response actions and has to execute the state's emergency plan. Next, the governor conducts a preliminary damage assessment in order to determine the extent of damage the event has had on facilities and the public. The information from the preliminary damage assessment is sent to the president for a possible formal declaration. Based on the information provided by the governor, the president may declare the event an emergency or a disaster, if so warranted. When a declaration has been issued, the federal government activates federal programs to assist the response and recovery process.

Title I also specifies the difference between an emergency and a major disaster. The different declarations result in different federal responses. An emergency is viewed as being smaller in scale than a major disaster, requires less or limited federal involvement, and is capped at no more than $5 million per emergency. A major disaster is characterized as an event that warrants major disaster assistance and requires significant federal involvement and resources. Examples of major disasters are tornadoes, earthquakes, droughts, tsunamis, and explosions. Some examples of events not considered under the Stafford Act are refugee circumstances, riots, and radiological, chemical, or biological events.

Title II of the Stafford Act focuses on disaster preparedness and mitigation assistance. Specifically, it provides the president with the authority to provide technical assistance to states to complete comprehensive plans and provide funding for preparation activities, as well as revive emergency operations plans (EOP) and pre-disaster hazard mitigation plans. Title II also includes provisions for readiness and use of the disaster warning system. Under Title III, the president has the authority to appoint a federal coordinating officer and activate any federal agency's employees, equipment, facilities, or other resources deemed necessary for the disaster response and recovery effort, with or without compensation.

Under Title IV, the president is authorized to provide financial relief for housing-related issues, such as mortgage or rental payments for those experiencing financial hardship or people who have received eviction notices, and cover local governments' loans. This also includes the reconstruction of federal buildings. Other relief programs include government food (commodities and vouchers), relocation, psychological and legal services, transportation, and more. Under Title V, a governor can request the president to make available economic recovery funds, and the governor creates a Recovery Planning Council for long-term recovery plans. The president provides funds for the council and can authorize up to $250 million for long-term recovery efforts. Title VI is focused on emergency preparedness and is based on the Civil Defense Act of 1950. The basic difference between the two public laws is that the term *civil defense* has been substituted with the term *emergency preparedness*. Emergency preparedness is defined as mitigation, response, and recovery activities that include training and exercises relating to emergencies and disasters. Title VII authorizes the president to modify rules, regulations, and procedures in order to aid the recovery process.

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See Also: Department of Homeland Security (DHS); Disaster Declaration; Federal Emergency Management Agency (FEMA); Policy Setting; Political and Organizational Leadership.

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Stakeholders

The onset of any type of crisis has the ability to impact a large number of people. The crisis not only affects those directly involved; the actions and consequences often concern and have an impact on the stakeholders in the organization. For an organization, stakeholders are those people or organizations that have a vested interest in what has happened and are affected by the decisions that the leaders in the organization make. If the stakeholders consider a situation a crisis, then it often is and should be treated like one.

An organization has both internal and external stakeholders. Internal stakeholders are those who are often most dependent on the organization, such as employees, students, trustees, and stockholders. External stakeholders are often those impacted by the actions of the organization and could include consumers, outside agencies, and the community. In order to be successful in crisis management, the organization needs to treat its stakeholders with compassion, concern, and sensitivity.

Communication

The organization has a responsibility to protect its stakeholders and keep them informed of what is happening during a crisis. The stakeholders can become disenfranchised if they do not feel they have been kept informed or their needs have not been met. In the modern era of instant access to information and communication, organizations need to have strategic plans to communicate with all their stakeholders. Stakeholders have the ability to find out about a crisis almost instantly and often much quicker than an organization would like in a crisis situation. Communication may go out through press releases, press conferences, e-mail, Web sites, phone, texts, blogs, and social media networks such as Facebook and Twitter. People often respond emotionally in crises, so the communication needs to be clear, accurate, and precise. Depending on who the stakeholders are, different communication plans need to be devised for them.

Internal stakeholders such as employees often need very specific communication, such as how/whether to continue their job or assist in the situation. Internal communication is communication the organization may not want external groups such as the media to hear about because of sensitivity on subjects such as payroll, work schedules, leave policies, designation of essential personnel, rumor control, proprietary information, internal phone numbers and e-mail, or secure information. Internal communication is often best handled through direct contacts such as meetings, e-mails, bulletin boards, intranet, teleconferences, letters and memos, and phone calls.

Communication to external stakeholders has become essential for organizations; this often occurs through processes similar to those used for internal stakeholders but also includes the utilization of outside media. Organizations need to be available to the media, be honest with them, and be willing to disclose information about the crisis even if they cannot discuss every detail. Organizations can utilize external communications to distribute vital information, control rumors, promote understanding, serve as a warning system, give evacuation information, provide educational resources, and define responsibilities to external stakeholders. An organization needs to be proactive with its external communications to inform, answer questions, and relieve the tension of stakeholders.

Case Study: Stakeholders at Louisiana State University During Hurricane Katrina

In higher education, a college or university has many stakeholders. These stakeholders include students, staff, faculty, trustees, legislators, donors, community members and organizations, parents and other relatives of the people who may be victims, media, general public, fans, and corporate partners. During Hurricanes Katrina and Rita in 2005, the administrators at Louisiana State University (LSU) received firsthand experience about the role stakeholders play during a crisis situation.

Hurricanes Katrina and Rita landed on the Gulf Coast of the United States within weeks of each other, causing unprecedented destruction and chaos. Although LSU, which is located in the capital city of Baton Rouge, a little over an hour from the coast, suffered damage from these hurricanes, it also served as an evacuation center for the region, especially for the city of New Orleans.

This unprecedented disaster taxed the region. The administrators at LSU became instrumental in assisting the community and playing a part in handling a small portion of this disaster and the recovery efforts. As LSU became the largest triage center on U.S. soil, officials had to answer to and rely on stakeholders to continue their operations. University classes and operations were suspended for a short time as the campus hosted federal agencies, volunteers, and evacuees. Following is a partial list of stakeholders that LSU administration worked with and the relationship they had.

Internal Stakeholders

Three groups of internal stakeholders were key to continued operation during the crisis.

Staff: When the hurricane was approaching, the general order of essential personnel was given to the staff members. Essential members showed up as in previous hurricane warnings, but the devastation was not like anything that was seen before. After the hurricane had passed through, the institution needed to find ways to locate and contact staff members about their return to service. With phone lines down and cellular towers disrupted, it was found that the easiest way to reach these stakeholders was through text messages. Many staff members had suffered damage to their homes and were hosting friends and family members from the New Orleans area. The staff members were responsible for restoring university operations, assisting with the crisis management operation, volunteering, and preparing the campus for an adjusted start to the academic schedule. Staff members had to adjust their operations and procedures to allow an influx of students from other colleges and universities in the New Orleans area to enroll at LSU.

The university staff were key in working with the Federal Emergency Management Agency (FEMA), the Federal Bureau of Investigation (FBI), the Red Cross, and other governmental agencies in the crisis management operation by providing assistance, office space, supplies, and volunteers for the operation. The institution relied on these stakeholders to assist with the crisis operation and to return the university to normal operations.

Students: The students at LSU had recently started classes when Hurricane Katrina slammed the coast. The students who lived on campus depended on the university residence halls and dining services for shelter and food. Facilities were without power, and hurricane damage on campus had to be cleared to enable transportation. The administration needed to get these operations running as soon as possible to assist these internal stakeholders. Students took in friends and family members from the New Orleans area, with these new "residents" living in their dormitory halls, apartments, and homes. Students also assisted the university in the recovery effort by volunteering with the crisis operation and triage center that had been established on campus. The administration committed to restoring normal academic operations as quickly as possible to cause minimum disruption to the academic cycle.

Faculty: As the hurricane approached, the faculty, like staff members, were told to stay at home unless they were essential personnel. After the hurricane, they returned to the campus as volunteers, assisting with the rescue efforts,

(Continued)

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utilizing their skills and knowledge. Faculty in foreign languages volunteered as translators for evacuees who were of many different nationalities, and the agriculture school opened its doors for the animals that were evacuated to the area. The institution relied on the faculty to modify their class schedules for an adjusted semester with an influx of additional students. LSU was responsible for communicating with and locating this stakeholder group after the hurricane and then utilized these stakeholders to restore operations at the institution.

External Stakeholders

In addition, three groups of external stakeholders reached out to support the university's efforts.

Alumni, Donors, and Fans: Alumni, donors, and fans reached out to the university to assist in recovery, providing medical supplies, food, and volunteers for the rescue operation on the campus. Money was donated to assist in the recovery effort, and a scholarship/grant fund was established to help students who were affected. LSU communicated with these groups through the media, e-mails, and the university Web page.

Parents: Parents of the college students turned to the university's Web pages, newscasts, and other communications to find out if their children were safe. Communication was disrupted, as many people were without electricity and phone service. Parents from the New Orleans area moved in with their children on campus and into the local Baton Rouge area. Some parents lived with their children for months after the hurricane. The university had to tell these stakeholders at a certain point that they would have to leave the residence halls as the institution returned to normal academic operations.

Government Agencies: Among the most important outside stakeholders were the local and national governmental agencies. LSU had established past agreements with a health agency in town to let it utilize facilities. This grew in magnitude because of the unexpected numbers of people who were evacuated to the Baton Rouge area and the role that federal agencies such as FEMA played on campus. The chancellor of the university felt that as a state institution, LSU had a responsibility to assist in the region with evacuation and recovery.

LSU's relationship with its stakeholders became essential to the successful management of the crises caused by Hurricanes Katrina and Rita. In the aftermath of the hurricanes, the role and communication process with the stakeholders was examined and redesigned to be more effective and more beneficial to both.

Stakeholders as Part of the Crisis Plan

The stakeholders should be part of the process from the beginning and not an afterthought in the development and execution of the crisis plan. The stakeholders can bring their expertise to the execution of the plan. They can provide valuable feedback on the crisis management plan and may be able to utilize their particular networks for the benefit of the organization. By being involved in the mitigation process, the stakeholders will know what to expect, understand the decision triggers when they are made, and know how to respond.

In the pre-crisis planning phase, stakeholders can be an influence in assisting with the design of the crisis mitigation plan. They can share their expertise on where they can assist, how they can provide resources, and the best way to communicate with them. Those stakeholders who might also be involved in assisting with the crisis situation, if it were to occur, can demonstrate how they could utilize those resources. Being part of the planning process builds trust between them and the organization.

During an actual crisis, stakeholders often look to the organization for the most up-to-date information. They are interested in how the crisis affects them and their relationship with the organization. The stakeholders may be able to provide assistance or resources through their unique enterprises. Organizational leaders need to clearly communicate with their stakeholders and have someone who can reach out, communicate, and organize them if needed. In the post-crisis operation, stakeholders can provide resources to assist with the cleanup in the aftermath. They can provide support and help in the rebuilding process, if needed. Finally, stakeholders can be vital partners in the evaluation of what happened during the crisis, because they can bring an outside perspective to the situation. Stakeholders can then be part of the discussion about the reevaluation of the crisis management plan.

By being part of the decision-making process, stakeholders gain trust in the organization. With trust between the stakeholders and the organization, they will believe and trust the organization if an actual crisis occurs.

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See Also: Collaboration; Command and Control; Coordination; Crisis Communications; Evacuation; Groupthink; News Media; Nongovernmental Organizations; Volunteer Coordination.

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State Emergency Management Agencies

Emergency management in the United States is a relatively new profession, originating in the civil defense context during World War I and more directly evolving during the Cold War after World War II. The latter especially connected the national security mission to the local security mission, particularly with exercises with the scenario of a Russian bomb reaching the United States and the use of a new technology, an elementary Emergency Broadcast System.

Large natural disasters, such as Hurricane Andrew (1992), Midwest floods (1993), Northridge earthquake (1994), 9/11 (2001), and Hurricanes Katrina and Rita (2005), have impacted the profession, leading to increased press coverage; voluntary standards; extensive legislation; federal guidance; state actions; and new planning, training, and exercise scenarios and efforts, all strengthening the profession. During this time, the number of emergency management degree and certificate programs in institutions of higher education has grown from two to over 257. Many young people are deciding early in their academic studies to become emergency managers, to serve as interns in state emergency management agencies, and to devote themselves to building the profession.

The National Emergency Management Association released its second annual report, titled "Emergency Management Performance Grants; Providing Returns on a Nation's Investment." The Emergency Management Performance Grant (EMPG) allows state, tribal, and local governments to make key investments to build capacity and enhance the capability of states and localities to respond to disasters. For the EMPG in fiscal year 2011, the highlights include the following:

- 78 State and 2,866 local emergency operations centers helped officials coordinate efforts for 57,469 events using EMPG funds
- State and local emergency managers conducted 6,156 classes related to emergency management, reaching 135,534 personnel
- Nearly 1 million participants took part in 3,890 state and local workshops, drills, and functional full-scale exercises
- 3,089 citizen and community preparedness outreach campaigns impacted 133,255,522 citizens across the nation

The Stafford Act is the prevailing legal framework for U.S. emergency management and the Federal Emergency Management Agency (FEMA), the lead federal agency for all such professional development, partnership building, planning, training, exercises, standards, guidance, certifications, credentialing, accreditations, thought leadership, and financial assistance/resource management during large disaster events, once a state's governor requests FEMA assistance based on the extent of a disaster being beyond the capability of the state to respond and recover.

The state emergency management agencies form the backbone of emergency management in the United States. The initial formation of these agencies on a state-by-state basis began with the adoption of the Emergency Management Performance Grant Program, providing a huge incentive for a basic program of emergency management in each of the 50 states and six territories. FEMA-appropriated funds paid 50 percent of the salaries of emergency managers for counties as well.

In 1974, state emergency managers created a professional organization, the National Emergency Management Association (NEMA), which has served as a unified voice, thought leader, and professional advocate supporting a wide range of activities and efforts, including an annual conference; annual policy forum; monthly newsletter; weekly newsletter for state directors; biennial survey reports on the profession; substantive Web site; effective convener; large resource library on emergency management books, articles, and materials; and a strong voice for the emergency management profession, especially state emergency managers and staff.

Additionally, NEMA has several key professional publications, including the *State Emergency Management Director Handbook*, *Model Interstate Mutual Aid Legislation*, and *Are You Ready to Lead? A Public Official's Primer on All-Hazards Emergency Management*.

NEMA is an affiliate of, and housed with, the Council of State Governments Center in Lexington, Kentucky, and at the Hall of States Building in Washington, D.C., along with the Emergency Management Accreditation Program office and the Emergency Management Assistance Compact office, creating a strong center of gravity for building the profession and the representation for state emergency managers, as well as the entire profession.

NEMA has a small, expert staff of 10 (eight in Lexington and two in Washington, D.C.) who, because of their close affiliation with the Council of State Governments, have an ongoing opportunity to work closely with other aspects of the larger state government context and to keep all aspects of states' governance issues and policies informed on emergency management.

Trina H. Sheets is the longtime director and an icon in the profession. Her staff includes a government relations director and a legislative policy analyst in the D.C. office, a senior policy analyst, an administrative assistant, a meeting and marketing coordinator, and, for the EMAC Program, a director, a technology analyst, an exercise and training director, and a training assistant.

NEMA is approaching its 40th anniversary as a vibrant, substantive, transparent, and trusted organization, effective in building the profession of emergency management and responsive to the increasing challenges of all hazards in a rapidly changing environment. According to NEMA, its six areas of major focus are as follows:

- Strengthening the relationship with Congress and federal agencies
- Developing strategic partnerships with key organizations and individuals impacting the profession
- Tackling emergency management issues through proactive committees
- Holding two national and annual policy conferences per year, providing presentations by thought leaders
- Serving as an information sharing and support network
- Offering professional development and training to state emergency managers and senior staff, honing their practical and strategic leadership skills

Paraphrasing the late Speaker of the U.S. House of Representatives Thomas P. "Tip" O'Neil, who said, "All politics is local," in the case of emergency management, "All disasters are local."

Therefore, the importance of state emergency management agencies cannot be overstated. These agencies derive their power and authority through their own governors. State governors have considerable authority through their own state constitutions, during emergency situations specifically, in most states, such as the ability to suspend regulations, order evacuations, commandeer private property, call up the National Guard, and impose curfews, to name a few potential actions. Also, the Tenth Amendment to the U.S. Constitution contains language designating public safety and welfare as a responsibility of the states. States were given police powers to protect the public.

These state emergency management agencies vary greatly from state to state, in size, organizational framework, status, and authority. They interface closely with related disciplines such as the fire service, law enforcement, public safety, emergency medical services, and related nonprofits. At the same time, the federal government largely sets the agenda for emergency management, especially for the funding, other resources, and priorities.

FEMA is the leading agency in the development of frameworks for planning, training, and exercises now with the Presidential Policy Directive 8 (PPD-8, 2011) guidance, producing an updated National Response Framework, a new National Disaster Recovery Framework, and a proposed Preparedness Framework, along with scheduled Frameworks for Mitigation, Prevention, and Protection.

State and territorial governors and their state emergency management agencies form a team approach for emergency management in the following ways:

- Conducting risk assessments to understand the hazards, threats, and vulnerabilities of jurisdictions in their state
- Knowing the state laws and authorities for disaster and being ready to executive them
- Assessing the state's emergency resources and capabilities
- Developing and implementing the state emergency operations plan
- Encouraging the public sector and private sector to collaborate with each other, as well as the nonprofit sector, following FEMA's organizing concept of "the whole of community," to include children, elderly, the poor, functional needs, and pets
- Leading the Presidential Disaster Declaration request process
- Implementing effectively state and federal assistance

The leader and manager of the state emergency management team is commonly referred to as the state director. According to NEMA surveys, in 34 states, that position is appointed by the governor and may also serve as the director of homeland security. Typically, this person is a domain expert and a trusted adviser and friend to the governor.

NEMA lists the general responsibilities of the state director as follows:

- Establish and maintain an integrated statewide emergency response structure
- Establish and maintain an effective organization, including plans, staff, facilities, and equipment
- Gauge, monitor, and support improvement of the emergency management capabilities of local governments
- Continuously assess and improve state emergency management capabilities
- Develop an effective public information capability and establish media relations
- Develop effective coalitions and volunteer agencies, nongovernmental organizations, business, and industry
- Plan for the whole community, including children, the elderly, the poor, the disabled, and pets
- Serve as the state coordinating officer during emergencies declared by the governor, facilitating the acquisition and application of state and federal resources upon request by impacted jurisdictions
- Serve as the governor's Authorized Representative, during the recovery process, channeling and coordinating federal recovery aid and assistance to impacted jurisdictions

FEMA's Comprehensive Preparedness Guide (CPG), Version 2.0, is the general guidance document for state, territorial, tribal, and local governments in developing plans, especially for emergency operations, integrating the subnational plans with those of FEMA, such as the National Incident

Management System (NIMS) and the National Response Framework. The basics, environment, principles, types, format, and functions of state planning are covered with some best practices and guidance, including the weaknesses of templates, lessening relevance, ownership, and creativity.

The National Disaster Recovery Framework has been released for guidance to states, localities, and tribes. Additionally, the PPD-8 guidance is under development at FEMA to provide a guide for general preparedness including those at the state level and a Preparedness Framework, out for comment, with a Mitigation Framework being planned.

Further, FEMA has developed a "whole of community" philosophy, approach, guidance, and organizing principle—called "principles, concepts, and pathways." This guidance was developed over the last couple of years and captures best practices, lessons learned, and ideas vetted from "research, conferences, listening sessions, and direct feedback from state, territorial, tribal, and local representatives, academia, nongovernmental organizations, community members, and the private sector."

Three principles represent the foundation set forth for establishing a whole of community approach to emergency management:

1. Understand and meet the actual needs of the whole community
2. Engage and empower the whole community
3. Strengthen what works well in communities on a daily basis

Voluntary standards are increasingly recognized and used throughout the profession of emergency management and at the national, state, and local levels.

The Emergency Management Accreditation Program (EMAP) works closely with states and local jurisdictions in offering training and conducting assessments in preparation for the necessary evaluations for accreditation. FEMA has provided funding on several occasions for nationwide reviews of state programs. These standards are intuitive and practical, as follows:

- Program management
- Administration and finance
- Laws and authorities
- Hazard identification, risk assessment, and consequence analysis
- Hazard mitigation
- Prevention
- Operational planning
- Incident management
- Resource management and logistics
- Mutual aid
- Communications and warning
- Operations and procedures
- Facilities
- Training
- Exercises, evaluations, and corrective action
- Crisis communications, public education, and information

The National Fire Protection Association (NFPA) has a similar set of voluntary standards for emergency management and business continuity, NFPA 1600, though without an accrediting process such as EMAP. Each of these documents is updated every three years. The current editions are for 2010, and the next is currently being updated for publication in 2013.

Currently, over half of the states and a number of localities are EMAP accredited, as follows:

- Alabama
- Arkansas
- Arizona
- City/County of Jacksonville/Duval, Florida
- Colorado
- District of Columbia
- East Baton Rouge Parish, Louisiana
- Florida
- Georgia
- Illinois
- Indiana
- Iowa
- Louisiana
- Maryland
- Massachusetts
- Michigan
- Mississippi
- Missouri
- Nebraska
- New Jersey
- New Mexico
- New York

- North Carolina
- Ohio
- Orange County, Florida
- Pennsylvania
- Pierce County, Washington
- City of Providence, Rhode Island
- County of San Diego, California
- South Carolina
- Tennessee
- Utah
- Vermont
- Virginia

Conditionally accredited programs have a number of areas in which to attain compliance during a nine-month conditional accreditation period; then they will be reviewed for full accreditation, including California; Denver and Colorado Springs, Colorado; Miami-Dade, Florida; and Oklahoma.

Kay C. Goss
World Disaster Management Foundation
for Higher Education Accreditation
in Emergency Management

See Also: Federal Emergency Management Agency (FEMA); National Fire Protection Association (NFPA) 1600, 2007, and 2010; National Incident Management System (NIMS); National Response Framework.

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Stock Market Crises

There is no formal delineation between bear markets and market crises, or crashes. The two phenomena overlap in their description of periods of significant losses in equity markets. Where they differ is often in the duration of the market decline. Bear markets tend to unfold over months or years and are often embedded in larger economic upheavals. In these cases, the bear market is not itself the "crisis" but rather one element of a larger pattern. The most dramatic recent example is the bear market in stocks that lasted from mid-2008 to spring 2009. Although the market suffered steep losses, these were part of a much larger complex of debt-fueled crises in the banking and housing sectors.

The phenomenon of a stock market crash differs largely in the speed and violence of the decline. In contrast to the relatively slow pattern of losses in a bear market, a market crash typically takes place in a short period of time, is not tied to any one fundamental cause, and leads to calls for greater controls to address the pattern of behavior particular to that crash. The following examples illustrate this pattern.

The Crash of 1929 and the Great Depression

The difficulty of identifying the causal relationships between stock market crises and broader economic crises is exemplified by the Great Crash of 1929 and the Great Depression, which are closely linked in historical accounts of the period. After a rapid expansion of stock prices through much of the 1920s, fueled by a combination of a strong economy and speculative investor behavior, the market became increasingly volatile in the fall of 1929, with several days of significant declines preceding the Black Friday plunge of more than 9 percent on October 24. The market fell by another 12.8 percent the following Monday and an additional 11.7 percent on Black Tuesday for two of the three largest percentage declines in the market's history. The market reached a temporary low on November 13, followed by an interim rally of nearly 60 percent, before it began to drop again. By mid-1932, the market was 89 percent below its September 1929 peak, a level it would not regain until 1954.

The Great Depression is generally viewed as having begun in 1929 with the Great Crash, though the causal role of falling stock prices remains a point of historical debate. For example, the drought and dust bowl conditions that plagued farmers in 1930, leading to widespread defaults on agricultural loans and bank failures, were an independent factor. That said, the actions by the Federal Reserve to control speculative activity in the stock market involved tightening credit conditions that also contributed to the failure of the U.S. banking system. Moreover, the effects of plunging stock prices on both corporate employment and widespread sentiment are widely cited as factors in the severity and persistence of the resulting downturn.

The policy response to the joint stock market and economic crashes incorporated a combination of public sector spending to support demand and regulatory constraints on market speculation. The latter included legislation such as the Glass-Steagall Act, which required the separation of commercial and investment banking activities, and the Securities Exchange Act of 1934, which led to the creation of the Securities and Exchange Commission to act as overseer of U.S. financial markets.

Black Monday: The Crash of 1987

Although referred to using similar terminology as the 1929 crash, the market event in 1987 occurred under very different circumstances. The stock market began sliding on Wednesday, October 14, and continued falling through Friday, declining an unusually large 9 percent for the week. The crash on Monday, October 19, called Black Monday, began when markets opened in Hong Kong and rippled westward across Europe to the United States. The Dow Jones Industrial Average then fell by more than 22 percent on Black Monday, the largest single-day decline in percentage terms in its history.

Although a number of macroeconomic and market causes have been explored, one of the most commonly cited is the increasing use of new trading technologies, such as portfolio insurance and market index futures. Portfolio insurance was an automated strategy designed to sell securities (typically index futures) when holdings in an investor's portfolio fell below a specified price in order to protect that investor's total portfolio value. On October 15, for example, the Brady Report on the crash asserted that portfolio insurance trading was significant during the final hour of the trading day.

Index futures are often used by arbitrage traders seeking to capitalize on differences between the value of a stock market index and its derivative value in the futures market. In cases where one market moves more quickly than the other, traders will usually trade away the price discrepancy, in the process moving the stock market and futures markets into closer alignment. As a result, at times when influences such as portfolio insurance trading drive down the futures market, the resulting arbitrage opportunity makes selling the stock market an attractive trade. These technologies together have been cited by both academic and government studies (see, for example, the Brady Report listed below) as key factors in the market crash.

Although the 1987 crash is remembered for its severity, it did not have a lasting effect on either the broader market or the economy. The Dow Jones Industrial Average ended the calendar year with an 11 percent gain and recovered to its pre-crash high within two years. Moreover, the broader economy posted positive gross domestic product (GDP) gains in every quarter of 1987 and 1988, with growth of more than 10 percent in the fourth quarter of 1987.

The New York Stock Exchange responded to Black Monday by instituting trading curbs. The curbs have evolved over time but have maintained the general feature of halting trading for a period

The Wall Street bull in New York is a symbol of bullish (optimistic) trading, but economic crises can turn the market bearish (a slow pattern of losses). On some occasions, the market has experienced a crash, which occurs over a shorter period of time.

of time that varies with the intensity of the price drop. As of the first quarter of 2012, the exchange was set to impose a maximum one-hour halt to trading for a drop of 1,200 points in the Dow Jones Industrial Average and a maximum two-hour halt for a drop of 2,400 points. A drop of more than 3,600 points would lead to a halt in trading for the entire day.

The Flash Crash of 2011

The most extreme example of a stock market crash decoupled from economic fundamentals was the Flash Crash of 2011, during which the market fell by more than 5 percent in less than five minutes and returned to its former level nearly as quickly. The entire crash and recovery took place in roughly 20 minutes.

As in the case of Black Monday, technology played a central (and more definitive) role in attribution of the Flash Crash. In this case, the culprits were high-speed algorithms that execute thousands of trades a second, much faster than humans can trade. Subsequent research by a governmental panel found that one large investor used an algorithm to hedge a position using stock market futures, which it traded on the Chicago Mercantile Exchange's computerized Globex Platform. The trades caught the attention of other investors' algorithms, leading to a spiral of selling, buying, and reselling that ultimately pushed prices of contracts down by more than 5 percent in less than five minutes. This fall in turn triggered the exchange's automated trading curbs, which imposed a halt in trading of five seconds. This was enough to halt the plunge in the futures market, and more orderly trading resumed when the halt was lifted.

The results were different in the equity markets to which the index contracts were linked. A separate set of arbitrage programs at work in the U.S. equity market trading individual stocks (as opposed to entire indices) then began rapid-fire trading based on the impact of the futures trading on the equity markets. The results were both chaotic and extreme, with values of some shares (such as those of Accenture) falling to one cent while others (such as those of Sotheby's) soared to $99,999. The market went on to recover, however, as the futures market rose in the wake of the imposed stop to trading, and the equity market to which it was linked followed suit. The anomalous trades in individual shares were ultimately invalidated.

The Flash Crash has fueled long-standing concerns among regulators and market participants about the impact of algorithmic trading, which is part of a constellation of practices (such as trading on "dark pools") that are transforming equity markets. The Commodities and Futures Trading Commission (CFTC), which regulates futures and other markets, announced the creation of a new committee to examine high-frequency trading early in 2012. In France, the government has proposed a set of transaction taxes that include a tax targeting high-frequency trading. The taxes await approval by the French parliament.

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See Also: Cascading Crisis; Crisis, Definition of; Debt Crisis.

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Strategic Plans

A strategy is defined by Oxford Change Management as "a set of agreed principles for the allocation of scarce resources in a specific context to create the most value." Strategic plans and the planning process form a key management approach for international humanitarian and development organizations. Strategic plans chart the course for the organization by outlining its aspiration for change, value system, and scope of operation, all set within a certain time frame. This article outlines the importance of strategic plans for international organizations, the key components in a plan, the process involved in developing a plan, some of the best practices in development and use of the strategic plan, and further resources to help the reader. A case study exemplifying a successful strategic plan development process is also included to provide a practitioner's perspective into strategic plans.

Importance of Strategic Plans

One of the key documents in organizations, a strategic plan helps provide guidance to managers toward agreed objectives. It also helps employees and departments within the organization move purposefully and cohesively in the work they do and helps them relate to a broader vision leading to staff motivation. Strategic plans also help senior managers make difficult decisions at times of crisis (Case Study 1). Although it is important to be flexible as the external context demands and to not be bound only by the diktats of the strategic plans, presence of clearly laid-out plans certainly is very helpful in moving toward a larger goal/purpose. John Bryson, who focused on strategic plans for nonprofit organizations, summarizes the benefits of strategic plans as giving organizations the ability to do the following:

- Think strategically
- Clarify future direction
- Make today's decisions in light of their future consequences
- Develop a coherent and defensible basis for decision making
- Exercise maximum discretion in the areas under organizational control
- Solve major organizational problems
- Improve performance
- Deal effectively with rapidly changing circumstances
- Build teamwork and expertise

Case Study 1: Health Care Strategic Planning in India

Faced with a massive disaster in India, country managers of a large international organization were faced with the options of providing life primary health care and other services, and the field team as well as the government lobbied strongly for starting programs. However, looking at the strategic plan, it was clearly outlined (and reasoned) that the organization will not be involved in health care interventions but will respond to the root causes of poor health by improving sanitation by and safe water and hygiene promotion. This was explained to the staff and the government, and the decision was made not to implement health programs. Availability of a strategic plan clearly helped the senior managers in making the difficult decision and also convinced the government.

Components of a Strategic Plan

Key sections in a strategic plan are vision, mission, objectives, outcomes, strategies to achieve these, and resource needs. Depending on the context and scope, as well as organizational preference, strategic plans can be for one year, three years, five years, or longer. For large international organizations, there could be strategic plans at multiple levels: one for the broader organization, one each at region and country levels. Department/unit level (e.g., monitoring and evaluation department, human resources department, finance department, etc.) strategic plans are also not uncommon, deriving from the broader organization-level strategic plan.

The most common sections in a strategic plan and corresponding activities to develop those are as follows:

Analysis of internal environment: This includes a review of organizational achievement over the past years to determine the way forward. A common tool called SWOT analysis (strength, weakness, opportunity, and threat) is used with teams in this process in order to objectively evaluate the situation against reality and draw recommendations from the same. This is a crucial process that determines the strength of the strategic plan.

External environment: Recognizing that the organization works in the context of an external milieu, analysis of the external environment is important. This includes developing understanding on a wide range of issues, for example, the policies and plans of the government for the host country (see Case Study 2), donor priorities and funding environment, operational contexts (e.g., security, access to program areas, disaster vulnerability), work of other actors, and whether there is opportunity for collaboration or risk of duplication.

Identification of the target audience/beneficiary: There is a need for clearly identifying the target audience for an organization so as to identify programs that would serve them and strategies to reach them. Some organizations put specific emphasis on population groups that are considered most vulnerable within a given context, for example, people living with human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS), orphans and minors, people with disabilities, women, and elderly populations.

Identification of program areas: These form the core business of the organization in a given country or region and are determined by undertaking needs assessments at the field level and discussions with beneficiaries, consultations with different stakeholders, review of secondary information, discussions within the organization at different levels, and so on. Most of the humanitarian and development organizations have identified focus program areas in which they tend to specialize, while also implementing a broad range of other interventions. For example, some organizations focus specifically (and invest significantly) on issues such as health, food and nutrition, logistics management, disaster risk reduction, gender, protection, governance, and so on. In development of strategic plans, these specialized areas are given prominence.

Inclusion of cross-cutting issues (issues that are important and need to be considered and included in all program activities) adds strength to the strategic plan by making sure the organization is able to improve quality of its work by being sensitive to those issues. Some examples of cross-cutting issues include the environment (making sure that the environment is not degraded and, if possible, enriched through program activities), HIV/AIDS (prioritizing and focusing on the special needs of this group), and gender (making sure that women and men are equally involved in decision making and existing gender imbalances are addressed).

Case Study 2: Government Censorship

In an east African country, the government decided that organizations (national and international) working on issues such as protection, rule of law, gender empowerment, gender-based violence, civic engagement, and democracy will be banned from operating. It was therefore extremely important for organizations developing strategic plans to work within this reality. Several organizations had to change their strategies, stop from operating in the country, or develop innovative strategies in order to continue their work.

Strategies to implement programs: A broad range of strategies are adopted by international organizations to implement their program activities, and this is a key consideration during strategic planning. These depend on the organization's focus, mandate, capacity, and issues it wants to deliver on as well as operational environment and resources available. Examples include direct implementation of activities by opening offices and having staff on the ground, working with local partner organizations (local nongovernmental organizations [NGOs], local authorities), working through advocacy and lobbying processes, and capacity building of local organizations.

Resources necessary to deliver the strategic plan: This is of crucial importance, as the success of the strategic plan depends on the availability of and feasible plans for mobilization of required resources, both internal and external. Examples of resources include financial, technical, and human capacity needed to make the strategic plan a reality. The plan needs to outline these in clear terms, along with responsibilities for team members, potential donors (funding), and timelines.

Indicators of success: These are outlined in order to help measure the achievements against the plan and make changes as may be necessary.

Timeline for the Plan and Midterm Plans for Review

Work plans: Work plans break down the broader strategies into specific tasks, with assigned time frame and responsibilities of team members. Achievement of each of these activities contributes toward realization of the overall strategic plan.

Vision and mission: These two components are the anchors that provide the plan its most important purpose—aspiration and scope for the organization. The word *vision* outlines what the organization wants to be or how it wants the world to be (an "idealized" view of the world). It is a long-term view and concentrates on the future. It can be emotive and is a source of inspiration. For example, a charity working with the poor might have a vision statement that reads "A World Without Poverty." The word *mission* defines the fundamental purpose of an organization or an enterprise; it succinctly describes why it exists and what it does to achieve its vision. For example, the charity above might have a mission statement such as "providing jobs for the homeless and unemployed."

Strategic Planning Process

A large number of processes, tools, and approaches are used in development of strategic plans. Some of the key factors that contribute in deciding the approaches are the following:

- Time available to develop the plan and period for which the plan is being developed. For example, a strategic plan for the next 10 years will require much more thorough analysis and rigorous discussion compared to a plan that is for one year.
- Scope of the plan: whether it is for the larger organization or for a specific unit/department.
- Context: whether the organization is focused on emergency or development context and how much the context has changed since the last plan was prepared.
- Level of detail required: whether the plan is aimed to cover the broader mission, goal, objectives, and strategies or whether it is expected to also provide other details, such as geographic focus, financial ambitions, and plans for specific units within the organization and so on.
- Extent of participation: from team members, external actors, and so on.

A range of tools are available and can be used in development of strategic plans based on the above issues and others.

Case Study 3 explains the process involved in development of a five-year strategic plan for the International Rescue Committee (IRC) for its work in Kenya.

Good Practices

Strategic plans can only be as useful as the organization and staff choose to make them. There are many experiences of well-researched and well-written plans not really being used in decision making, and in many other functions, the plan was intended to support as a guide. Some of the good practices in development and use of strategic plans are described below:

- Keep the plan based on reality to the extent possible: Although it is great to have lofty ideas and aspirations, too much can make a strategic plan lose its relevance in actual work the organization is doing, thereby adding less value. Plans must be based on the reality of the organization's past and the current context in which it is working.
- Keep strategic plans brief, simple, and free of jargon. Lengthy documents with excessive use of rhetoric and jargon make a strategic plan less attractive as a useful document for staff. The language must be direct and easy to relate to.
- Be willing to change and be honest in the strategic planning. Development of a strategic plan offers an excellent opportunity for organizations to understand what is working, what needs to change, and what opportunities can be embraced. These changes must be reflected as accurately as possible in a strategic plan. This may

Case Study 3: Strategic Planning Process for Kenya, International Rescue Committee (IRC)

The IRC has been working in Kenya since 1992, implementing programs focused on assistance to refugees, vulnerable Kenyan communities living in arid regions, and urban centers. The organization embarked on a five-year strategic planning process for Kenya with the primary purpose of developing a clear plan for its work in the country and a broader vision that staff can relate and contribute to, derive decisions from, and be motivated by.

The following processes and activities were carried out in development of the strategic plan. The entire process took over nine months.

1. ***Decision and information sharing:*** The strategic plan derived from the larger organizational guidance to all country programs to develop country-specific strategic plans. The senior management team for the country program discussed the broad steps and activities that will be carried out in development of the plan. An all-staff communication was sent out to this effect. The plans were also shared with the regional and head offices. This helped in bringing the larger team together on the plan and awareness of the process.
2. ***Field level analysis:*** Each of the four offices of the IRC in the country took up an external and internal analysis exercise (a set of questions and guidance were provided to the field offices to ensure this) involving a cross-section of staff at the office held meetings with local authorities at the district level, line ministries, other organizations, and community leaders. Reports were then prepared and shared with the country office, answering the key questions and providing broad recommendations. Similar processes were carried out at the country-office level in Nairobi, including meetings with a range of donors, government officials, and partners. This helped the field teams to articulate issues from external actors, including beneficiary communities and their own views.
3. ***Field level workshops:*** Following the above exercise, senior staff from the country office held two-day workshops at each of the field offices to understand the findings and delve into issues through a series of presentations, focus group discussions, and sharing. These workshops helped senior management team get clarity on issues, challenged field teams on their recommendations, and deepened team participation.
4. ***Discussions internally within the organization:*** A large number of meetings were held with a range of internal team members at regional and head offices (technical advisers, security leads, operations leaders, etc.), seeking their advice and input in the process. This helped in creating an organizational buy-in for the country-level strategic plan and process.
5. ***Country-level drafting meetings:*** Based on the findings and recommendations from the above, a smaller group of senior staff drafted various sections of the strategic plan. Discussions back with the field teams, head office, and regional office continued throughout this stage. This helped in crystallizing ideas into clear plans.
6. ***Country-level strategic plan workshop and finalization:*** A two-day workshop culminating the above processes and activities resulted in the draft plan being presented, discussed, debated, and redrafted. This made sure the country senior management had complete engagement, buy-in, and ownership of the plan.
7. ***Sign-off and dissemination of the plan:*** The plan was then presented to the senior leaders within the organization, and approval was received. The plan was then shared with all staff within the country program. Senior staff took on the responsibility to share the staff with various stakeholders who had contributed in development of the plan. Plan dissemination helped ensure feedback and support from staff as well as external actors.
8. ***Inclusion of the plan elements and integration:*** Components and directions

(Continued)

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provided within the strategic plan were systematically integrated in development of program sector plans, staff performance objectives, fund-raising and communication plans, operation development plans, staffing plans for the country program, and so forth.

An annual work plan was also developed, drawing from the strategic plan with activities, timelines, resources needed, and indicators. It is crucial that a strategic plan become a part of the normal functioning of the organization rather than just a document.

require sacrifices (e.g., letting staff go, closing offices, starting new programs, working harder to raise funds, partnering with others, and so on), and managers must be willing and committed to make them.

- Review strategic plans and measure achievement against them. Contexts change often, sometimes dramatically, requiring strategic plans to be reviewed and revised to be meaningful. This is especially important for plans that are developed for the longer term (three years or longer). Also important for managers is to regularly (e.g., every six months) review the achievement against the strategic plans to measure achievement and refocus resources as needed.
- Participation in strategic planning. Of crucial importance for a successful strategic plan is the element of ownership by staff, partners, and others as relevant. Involvement of staff and other stakeholders in development of strategic plans therefore is a vital first step in ensuring that they are aware of the content of the plan, have contributed to it, and therefore remain accountable and committed to achieve it. At the same time, it is also important to draw a balance between participation and decision making. Managers leading strategic plans must be able to make appropriate decisions that will help in achievement of the strategic plan rather than conceding to specific group interests within the organization.
- Integrate the strategic plan in the organization's work. It is important that the strategic plan be directly linked to activities of the organization at a practical level. Work plans that outline specific activities taken from the broader strategies form a connecting link that staff can relate to immediately. Other examples of integrating strategic plans are decisions on staffing structure, inclusion in staff performance objectives, or fund-raising plans.

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See Also: Contingency Planning; Decision Making; Incident Action Plans; Nongovernmental Organizations; Operational Plans; Operational Readiness; Political and Organizational Leadership; Pre-Crisis Training and Planning; Risk Analysis; Stakeholders; Sustainability.

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Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

SWOT is an analytical tool for strategic management planning devised in the 1960s by Albert S. Humphrey, a business consultant at the Stanford Research Institute. It analyzes the organization in terms of strengths, weaknesses, opportunities, and threats, usually represented in a 2 × 2 matrix. The first two concepts look at the organization's internal environment and conditions, whereas the latter two analyze its external (meso- and macro-) environment. The assumption underpinning this tool is that once the strengths and weaknesses of the organization have been elaborated and the opportunities and threats identified, appropriate strategies can be developed for the organization to achieve its strategic objectives.

The SWOT analysis is also a useful tool for risk management in the stage of risk identification and analysis. It can be used as a framework for the development of alternative risk strategies and can therefore be effectively used in pre-crisis planning and preventive crisis management.

When constructing the 2 × 2 SWOT matrix, the first two quadrants are normally occupied by Strengths and Weaknesses, and the lower two by Opportunities and Threats. From a risk management perspective, strengths and weaknesses are competencies (or upside internal risk factors) and vulnerabilities (or downside internal risk factors) of the organization that are, however, within its control and can be affected by appropriate management action. For example, the existence of rigorous safety standards and of a strong crisis culture is within the control and influence of the organization and are strengths (upside factors) on which it can capitalize in order to achieve its strategic objectives. On the other hand, increased debt from building new sites, although also within the control and influence of the organization, is a vulnerability (downside factor) that needs to be minimized or eliminated so that it will not hinder the organization in achieving its strategic objectives. Similarly, opportunities and threats are upside and downside external risk factors, the sources of which are beyond the control of the organization, and the organization can only take measures to modify (optimize or minimize) their likelihood of occurrence or their impact. Technological developments in the field of security and the rise of religious fundamentalism are examples of such risk factors.

SWOT Matrix

The SWOT matrix can also be used as a matching tool that helps risk managers to combine these risk factors and develop four types of strategies: SO, WO, ST, and WT.

"SO" strategies utilize the organization's internal strengths to take advantage of external opportunities. An example is for an organization that has embedded a strong environmental culture in its business activities and practice to take advantage of government incentives to "zero" its carbon footprint.

"WO" strategies aim at reducing the organization's internal weaknesses by taking advantage of external opportunities. For example, the organization has long ago identified that the computer systems supporting daily customer orders and storing customer data for customer relationship management are becoming antiquated and soon will be obsolete (internal weakness). Cloud computing is an external opportunity that may resolve this issue.

"ST" strategies capitalize on the organization's strengths to modify the likelihood of occurrence or the impact of an external threat. For example, the organization can capitalize on the expertise of its managers in the legal, internal audit, and risk management divisions to minimize the impact of a new regulatory framework on the organization.

"WT" strategies are usually defensive strategies aimed at reducing internal weaknesses and avoiding external threats. An example is the increased threat for cyber attacks (something that is beyond the organization's control) combined with lax IT security standards in the organization.

SWOT offers two advantages in the risk analysis process. First, it encourages a balanced approach in the identification of not only upside and downside risk factors but also internal and external. Second, with the matching process, it can provide a starting point for interesting and sometimes creative risk strategies by revealing possible relationships between the various risk factors. However, its analytical usefulness is limited, as it does not explicitly state the relative importance of the various risk factors that would allow their distinction in terms of their severity. It can, therefore, only be effectively used in conjunction with risk mapping, influence matrices, and other more quantitative tools, such as dependency modeling, real option modeling, or event tree analysis.

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See Also: Operational Readiness; Risk Analysis; Risk Assessment; Risk Treatment.

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Strikes

Strikes are work stoppages caused when employees refuse to work in response to employee grievances regarding wages, working conditions, or other issues. Strikes first became an important tool of labor unions during the Industrial Revolution and have evolved to serve as a significant means by which workers can achieve their goals. Strikes are often used by workers and labor unions to seek change, be it economic, political, or social. Although often brought against privately or publicly owned companies, strikes can also be used to pressure governments to achieve political change or policy modifications. Both labor and management devise crisis management policies and procedures to deal with strikes, and such programs are often hotly contested.

Background

Although strikes have been occurring for centuries, the term was first used in the English-speaking world in reference to a group of London sailors who staged a series of demonstrations in 1768, crippling a fleet of merchant vessels by removing their sails as part of a dispute with the ships' owners. Most strikes today are undertaken by labor unions as part of collective bargaining, the process through which an employer and a group of its employees endeavor to reach agreements regulating working conditions. Collective bargaining agreements set wage scales but may also set forth working hours, training opportunities and responsibilities, health benefits, safety procedures, overtime pay and procedures, grievance processes, and rights to participate in company governance. When the parties are unable to reach a collective bargaining agreement, unions sometimes use strikes as a last resort, stopping work when, or after, a labor contract expires. Collective bargaining agreements may contain a "no strike" clause, which means that no work stoppages may occur during the period for which the labor contract is in effect.

Strikes generally involve workers refusing to attend their jobs and may include a form of protest called "picketing," in which striking workers gather outside their place of work with signs demonstrating dissatisfaction with their employer. Picketing may occur to increase public awareness of the strike, to place pressure upon the employer to bend to the wishes of the union, or to dissuade other workers from returning to work. In certain circumstances, workers may decline to strike, but instead "work-to-rule," meaning they fulfill the minimum requirements of their jobs but no more. In the United States, private-sector employers and their workers' unions are regulated by the National Labor Relations Act (NLRA). Pursuant to the NLRA, strikes are designated to involve either economic issues or unfair labor practices. In the event of a strike involving economic issues, an employer may not fire striking workers but may permanently replace them with other workers. If a strike is over unfair labor practices, however, the employer may not replace employees who strike and must fire any employees hired as strikebreakers when the striking employees return to work. A general work stoppage involving multiple unions directed against the government is called a general strike.

Strikes can be detrimental to both labor and management. Workers do not get paid during strikes and, under certain circumstances, can be replaced by other workers. These work stoppages can also be harmful to employers because they disrupt business and may drive customers to competitors. As a result, both unions and management may attempt to plan a strategy to deal with strikes, both before they are declared and during the work stoppage.

Strike Strategies

When a union declares a strike, one goal is to stop the employer from being able to operate as it normally does. Because of this, strikebreakers—either union members who choose to cross the picket line and return to work or temporary employees brought in to combat the work stoppage—are detrimental to the union's goals and encouraged by management. Strikes are somewhat predictable insofar as they follow the expiration of a union collective bargaining agreement. Employers who produce goods that are sold to the public may therefore increase production in the weeks or months leading up to a strike, in order to stockpile goods that can be offered for sale during the strike. Companies also may purchase strike insurance, which pays them when a strike occurs, thereby minimizing losses occurring as a result of the work stoppage.

While union members are engaged in a work stoppage, their employer may hire replacement workers to maintain business operations. This action puts pressure on striking workers, who not only lose the wages they might earn if not on strike but also may question whether they will be permanently replaced. To counter this threat, striking workers often attempt to inhibit the use of strikebreakers through a variety of methods. These methods include creating picket lines where strikebreakers enter the place of employment, discouraging strikebreakers from continuing employment with management, raising the cost of hiring temporary workers, or using public relations firms to increase public support for the strike. Companies faced with such tactics often increase costs for security near the place of employment to facilitate strikebreakers' entrance and egress from the facility and by seeking court injunctions to prohibit activity they deem inappropriate and threatening.

Although unionized private-sector employees in the United States have the right to strike, employers may choose to permanently replace them, an act sometimes referred to as "union busting." Public-sector employees working for the federal government have the right to join trade unions but are prohibited from striking. In 1981, faced with a strike by members of the Professional Air Traffic Controllers Organization (PATCO), President Ronald Reagan fired striking workers, causing the dissolution of the union. Since the 1980s, strikes have decreased in frequency, in part as a result of union member fears regarding their ability to return to work following a strike.

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See Also: Air Traffic Control; Blame, Politics of; Business Continuity Planning; Civil Protection; Disruption of Organizations; Income Inequality and Labor Unrest; Political and Organizational Leadership; Protest.

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Structural Secrecy

Structural secrecy refers to the concealment of information by the structural features of organizations: their size, complexity, geographic dispersion, social distance between members, and the specialization of knowledge, tasks, and language. The concept was first articulated by sociologist Diane Vaughan in her 1998 study of the National Aeronautics and Space Administration's (NASA) fatal decision to launch the space shuttle

Challenger, which broke up shortly after launch in 1986. A malfunction in one of the shuttle's solid rocket boosters led to the disintegration of the vehicle and loss of its crew shortly after launch. Subsequent investigation revealed that NASA had been aware of the flaw in the solid rocket boosters that caused the tragedy but had misjudged the risk it posed. Vaughan concluded that a contributing factor to this misjudgment, and hence the tragedy itself, was structural secrecy.

As Vaughan described it:

> Secrecy is built into the very structure of organizations. As organizations grow large, actions that occur in one part of the organization are, for the most part, not observable in others. Division of labor between subunits, hierarchy, and geographic dispersion segregate knowledge about tasks and goals. Distance—both physical and social—interferes with the efforts of those at the top to "know" the behavior of others in the organization—and vice versa. Specialized knowledge further inhibits knowing. The language associated with a different task, even in the same organization, can conceal rather than reveal. Changing technology also interferes with knowing, for assessing information requires keeping pace with these changes—a difficult prospect when it takes time away from one's primary job responsibilities. Also—and ironically—rules created to communicate more information can result in knowing less. Rules that guarantee wide distribution of information can increase the paperwork on individual desks so that a lot is not read. Executive summaries, although effectively conveying major points, condense and omit information, selectively concealing and revealing.

The major sources of structural secrecy can be categorized as stemming from either size or complexity. First, consider size. In a large organization, dispersed over a wide geographic area, information flow is limited between members. For instance, a cashier at a coffee shop in Seattle can communicate more easily with a coworker standing next to her than with her counterpart at a shop in New York. This limitation is compounded as complexity is added to the organization. As the division of labor is increased, information becomes segregated by specialization of knowledge and tasks. To continue the coffee shop example, one cashier can more effectively share organizational information with a fellow cashier than with a delivery person, a supply chain manager, or a corporate accountant. Along with the division of labor comes social distance through hierarchy. Messages traveling through a status hierarchy can be distorted on the way up as well as on the way down. A subordinate may be tempted to conceal bad news from a superior, or minimize its extent, for the sake of saving face. Alternately, information traveling up a hierarchy might be ignored or minimized. This process can also happen in reverse. Additionally, information from the top of the hierarchy can be distorted as it travels down, passing through several layers of interpretation by managers at intermediary positions in the organizational structure. Finally, inconsistent or incomplete execution of reporting requirements across an organization can conceal information as it crosses boundaries within the organization—concealing information while presenting the appearance of transparency. As Vaughan noted in 1999, structural secrecy not only increases the possibility of crisis through failures of knowledge, but also simultaneously "minimizes the ability to detect and stave off activities that deviate from normative standards and expectations."

Implications for Crisis Management

Though they seem chaotic, most crises are in fact organized, one way or another—that is to say, they emerge and unfold along the lines of failure in organizations. Often, these precipitating failures can be prevented, or their effects minimized, through effective information sharing. Vaughan, building on work by Barry Turner (1976), has shown that organizational failures are rarely if ever "bolts from the blue" but grow out of an incubation period, during which intelligible signals of impending failure are broadcast through the organization. If these signals are weak, mixed, or dismissed, disaster is more likely to follow. For example, Vaughan (1996) described the role of signal processing and structural secrecy as a contributing factor to NASA's decision to launch the *Challenger* in a description of a teleconference between engineers and managers on a teleconference on the eve of the launch:

> Engineers were aware that conditions for the impending launch created an unusually elevated risk of catastrophic failure because of long-recurring problems with the seals that kept hot gases from leaking uncontrollably from the solid rocket booster, but these concerns were obscured by structural secrecy: The engineering discussion [on whether or not to launch the shuttle] was undermined by structural secrecy at the outset because participants were in three locations. As the teleconference got underway, the original technical culture, bureaucratic accountability, and political accountability exacerbated this structural secrecy by affecting both the production and exchange of information. Instead of an irrefutable signal that matched the engineers' sense … the result was weak and missing signals incapable of altering the scientific paradigm supporting the belief in acceptable risk.

Structural secrecy can also obscure both legitimate and illicit activity; the unauthorized activities of a rogue employee (or group of employees) may be unintentionally hidden until they result in catastrophic failure for the organization. Crisis managers should be keenly aware that the structure and processes of an organization can be as effective at passively concealing critical information as deliberate activity by individuals. Special attention should be paid to the content and enforcement of reporting practices and mitigating against secrecy generated by the geographic, technological, and cultural characteristics of the organization.

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See Also: Bureaucracy; Crisis Communications; Groupthink; Information Asymmetry; Information Vacuums.

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Suicide Bombings

Suicide bombings are not new; indeed, there is evidence that they have occurred in one form or another for the last 300 years. For instance, during World War II, Japanese kamikaze pilots deliberately flew their planes, loaded with explosives, into Allied military ships. However, since the first occasion in 1981, when explosives were carried and detonated while on the person, they have become increasingly popular over the last 20 years or so as various terrorist groups around the world, notably Hamas, Islamic Jihad, the Tamil Tigers, and the Kurdistan Workers' Party (PKK), have used them as a method of attack. Such groups have used a range of methods to carry the bomb other than on the person, such as various kinds of motorized road transport, including gasoline tankers, bicycles, small boats, and airplanes.

The Institute for Counter-Terrorism (ICT) has defined suicide bombing as an "operational method in which the very act of the attack is dependent upon the death of the perpetrator." It is used because it is a relatively simple and low-cost operation, requiring no escape route; it increases the likelihood of mass casualties and extensive damage, since the bomber, or the person detonating the device remotely if not the suicide bomber, can choose the exact time and location of the attack; and it has an immense impact on the public and the media.

In order to gain the maximum publicity for their cause, unless they are targeting a

Five hijacking terrorists used American Airlines flight 77, a Boeing 757-223 traveling at 530 miles per hour and carrying 10,000 gallons of fuel, essentially as a suicide bomb to hit the Pentagon in Washington, D.C., on September 11, 2001. An aerial photograph taken on September 14, 2001, shows some of the destruction of the west face of the building. The attack followed similar attacks using aircraft on the Twin Towers of the World Trade Center in New York City.

high-profile individual, as the Liberation of Tamil Tigers Eelam (LTTE) did twice in assassinating the Indian prime minister, Rajiv Gandhi, and the president of Sri Lanka, Ranasinghe Premadasa, suicide bombers tend to target facilities that will afford them the maximum number of casualties. Thus, in 1983, a single suicide bomber in a truck packed with explosives was able to kill 242 soldiers in a single attack on the U.S. Marine barracks in Beirut; in a separate attack in the same city, another suicide bomber was able to kill 58 French paratroopers in a single explosion. If the facility is also an iconic location, that is an added bonus. In 1998, the U.S. embassies in the Kenyan capital, Nairobi, and the Tanzanian capital, Dar es Salaam, were subjected to separate but simultaneous attacks by suicide bombers driving trucks laden with explosives. In excess of 220 people were killed, most of them Kenyan and Tanzanian nationals, although the targets were plainly American. In January 2011, 37 people were killed and 173 injured at Domodedovo International Airport, Moscow, by a suicide bomber; seven months later, it was the United Nations Building in Nigeria.

By far the most suicide bombings have taken place in areas of insecurity, such as Israel, Sri Lanka, Iraq, Pakistan, and Afghanistan, but there have been some such attacks in liberal democracies, and many more have been foiled by the vigilance of Western intelligence and law enforcement agencies. For instance, in 1997, a double-suicide bombing planned for the New York City subway system was prevented literally hours before it was due to take place. Two years later, a person who was planning to detonate a bomb in a terminal of the Los Angeles International Airport was arrested in possession of bomb-making equipment. And then, of course, on September 11, 2001, 14 terrorists used three planes as suicide bombs by flying them into the Twin Towers in New York and the Pentagon; a fourth plane was prevented by the crew and passengers from reaching its potential target. In December 2001, Richard Reid was overpowered by cabin crew and passengers as he tried to explode material contained in his shoe while on a flight from Paris to the United States. In July 2005, four suicide bombers mounted coordinated attacks on the London subway system.

The reasons why people, both male and female, become suicide bombers are many and varied; consequently, it has been extremely difficult to build a profile of suicide bombers. Some have been well educated, having gained a university education; others were poor. Some exhibit classic or conventional suicide traits; others are motivated by their beliefs.

Security experts are still grappling with the problem of what can be done to prevent a suicide bomber from reaching a target. Airports have fairly sophisticated security systems, metal detectors, and explosive detection machines, including X-ray machines and portable explosive trace detection machines, to check both people and luggage, which were initially introduced in response to the increasing number of hijacks. Other forms of transport, such as ferries, trains, and buses do not have such security. In those countries that have suffered regularly from acts of terrorism, shopping centers and hotels are likely to have metal detectors but little else. High-profile targets in areas where the threat is greatest are also likely to have one or more perimeter controls. Increasing the number of roadblocks to stop both pedestrians and vehicles, particularly in the vicinity of iconic targets, is another measure that is often introduced. Perhaps the most successful way of preventing suicide bombers from achieving their objectives is through the careful collation and dissemination of intelligence.

The potential of being confronted by suicide bombers places law enforcement officers in a dilemma. In most liberal democracies, a warning should be given before any police officer considers using deadly force. However, the mere shouting of a warning will make the suspect bomber(s) aware that they have been identified as such, and the likelihood is that they will detonate the bomb immediately. In addition, there are devices used by law enforcement officers, such as mobile phones or Tasers, that could detonate it.

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See Also: Air Travel; Perimeter Control; Terrorism; Threat Detection; Transportation Security.

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Supply Chain

The Association for Operations Management (APICS) defines the term *supply chain* as the "processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies" as well as "functions within and outside the company that enable the value chain to make products and provide services to the customer." More specifically, supply chain refers to suppliers, manufacturing facilities, distribution centers, warehouses, customers, raw materials, work-in-progress inventory, finished goods, and all related resources involved in meeting customer and organizational requirements. The term *supply chain* invokes images of products or materials moving from suppliers to manufacturers to distributors to retailers to customers along a "chain." Related information and resources flow in both directions of the supply chain.

The term *supply chain* may imply that only one source is involved at each stage; however, a manufacturer and/or organization may receive material from several suppliers and, in turn, supply several distributors. Hence, many supply chains are networks and more accurately identified as "supply networks" to describe the structure of most supply chains.

Supply chains vary based on sector- and organization-specific demands. The supply chain facilitates and provides resources and materials, beginning with the acquisition of raw materials and extending through the delivery of products or services to the end user.

Supply chain components may include suppliers, vendors, facilities, manufacturing, logistics, transportation, distribution, wholesalers, and other functions associated with end-user fulfillment.

Other terms used to describe supply chain include *resource chain* and *value chain*, although *supply chain* is among the most common terms used. These and other associated terms apply to business, nonprofit, and public sectors.

Logistics is an important aspect of the supply chain. Logistics is the process of obtaining, producing, and distributing materials and products associated with the organization's products and/or services. Logistics includes departments and functions, including planning and coordination, associated with physical movement and operations to include supply acquisition and material transportation. Logistics is responsible for ensuring the most effective and efficient acquisition, mobilization, and use of resources to minimize cost. Additionally, logistics can include movement of personnel.

Supply Chain Risk Management

Beyond the massive loss of life, injury, and property damage, every major automobile manufacturer worldwide experienced supply chain disruptions as one of the results of the March 2011 Japanese earthquake, tsunami, and nuclear crisis. Toyota Motor Corporation reported losses of more than $1 billion in profits as a result of disruptions from these events.

The March 2011 events constitute a "cascading event." A "cascading event" is when one event generates one or more other events. The Japanese earthquake generated a tsunami, and these two events caused the Fukushima Daiichi Nuclear Power Station nuclear crisis.

Hurricane Katrina in 2005, the eruption of the Eyjafjallajökull volcano in Iceland in 2010, failing infrastructures such as the I-35 bridge collapse in 2007, terrorist attacks such as 9/11, and more recent plots involving air cargo shipments filled with explosives shipped to the United States via Europe and the Middle East remind us that even localized disruptions can escalate rapidly and impact U.S. global economic activity.

Major supply chain risks include, in no specific order, physical incidents impacting supplier or logistics to include supplier and organizationally owned facilities; financial failure of supplier; data security/informational technology incidents; supplier quality failure, product recall, or contamination; supplier litigation issues; regulatory concerns; breach of intellectual property rights; counterfeit products; pandemics; war; terrorism and other geopolitical concerns; and failure of service provision by internal or outsourcing partner organizations for any other reason.

Supply chain disruption ramifications can affect short-term and long-term sales, revenue, and profit. A company's reputation and goodwill can be positively enhanced when supply chain disruptions are minimized or mitigated and the end use customers are unaffected. Further, there may be opportunities to gain market share when less prepared competitors are adversely affected by supply chain disruptions and dissatisfied customers seek alternative providers.

Supply chain risk management (SCRM) involves understanding the organization's dependency, complexity, and mitigation of possible supply chain disruption. SCRM must be detail oriented to ensure that production and service demands are fulfilled while considering and managing global concerns. The term *global concerns* encompasses both worldwide (geographical locations and ramifications) and comprehensive (internal and external enterprise-wide risk management factors) such as economic, political, geographical, and crisis events. Crisis events include intentional (e.g., terrorism, espionage, theft), natural (e.g., floods, earthquakes, hurricanes, tornadoes), and technical (e.g., utility and technical service disruptions, hazardous materials incidents) risks.

The SCRM process includes utilizing supply chain best practices addressing identification of critical suppliers, identification of supply chain risk; inventory risks, mitigation of supply chain vulnerabilities; and monitoring and auditing of suppliers.

The mitigation of supply chain vulnerabilities includes supply chain contingency plans for critical suppliers. Additionally, it includes testing of contingency plans involving internal and external stakeholders. It is important that the company and its critical suppliers have appropriate contingency plans.

Inventory vulnerabilities must consider just-in-time inventory ramifications. Just-in-time inventory management seeks to maximize efficiency by having minimal inventory available to meet the near-term demands, resulting in reduced costs and increased profits. However, just-in-time inventory management increases vulnerability and possible negative ramifications to supply chain disruption, as there is little no or excess inventory available. Just-in-time inventory management must consider supply chain vulnerabilities and failures and balance just-in-time inventory efficiencies with inventory vulnerabilities. Just-in-time inventory mitigation measures include increasing available critical supplies beyond just-in-time inventory levels and/or contingency supplier options.

Supply chain stakeholder cooperation can be facilitated through technology and communications. Computer hardware, software, and telecommunications can be used to efficiently manage and monitor the supply chain. Integration of internal and external data is vital to effective supply chain management. However, access and use of supply chain internal and external data must consider protection of proprietary data and organizational competitive advantages.

During his January 2012 State of the Union Address, President Barack Obama announced a U.S. National Strategy for global supply chain security and its importance to international trade and economic growth for the United States and the global economy. He highlighted how nations worldwide rely on the efficient and secure global movement of goods including food, medicine, and energy as it relates to critical infrastructure, economic growth, and supporting our way of life.

Additionally, Secretary of Homeland Security Janet Napolitano reiterated the U.S. National Strategy for global supply chain security at the January 2012 Davos World Economic Forum in Switzerland.

In conclusion, in the most basic terms, the supply chain facilitates and provides resources and materials, beginning with the acquisition of raw materials and extending through the delivery of products or services to the end user. However, in practice, the supply chain is much more complex; balancing efficiencies with vulnerabilities requires effective risk management and can have both organization-specific and worldwide ramifications.

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See Also: American Society for Industrial Security (ASIS) SPC.1-2009; BS 25999; Business Continuity Management; Business Continuity Planning; Business Impact Analysis; Business Resumption Planning; Cascading Crisis; Commodity Shortages; Contingency Planning; Contingent Coordination; Coping Capacity and Response Capability; Impact Analysis; Logistics; Manufacturing Risks; National Fire Protection Association (NFPA) 1600, 2007, and 2010; Pre-Crisis Training and Planning; Pre-Impact Planning Process; Preparedness; Prevention; Recovery Time Objective; Resiliency; Resource Collapse; Resource Management; Response; Risk Analysis; Scenario Planning; Security; Simulations; Strategic Plans; Trigger Events; Vulnerability.

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Surge Capacity, Hospitals

Surge capacity is the ability of a hospital to respond to a sudden increased demand for care services, as might occur after a natural disaster, pandemic, or terrorist attack. In the United States, hospital surge capacity received a great deal of attention following the terrorist attacks in New York City and Washington, D.C., on September 11, 2001 (9/11), and substantial federal resources have been devoted to preparing hospitals, and the health care system in general, to respond to surge events. However, some critics charge that interest in maintaining appropriate surge capacity has declined in the United States as the events of 9/11 recede in memory and point to the examples of other countries that are more prepared to respond to sudden increases in patient load.

Characteristics of Events

In the literature of disaster response, as summarized by J. David Roccaforte and James G. Cushman, mass casualty events (MCEs) are distinguished from multiple casualty incidents (MCIs) as follows: Mass casualty events are major medical disasters that result in casualties that cannot be handled by community resources, while MCIs generate large numbers of casualties in a short period of time but can be handled with existing resources. The distinction is important because the ability of a system to respond to an emergency depends less on the absolute number of victims than on the ability of the receiving facility to respond to victims. For instance, in the terrorist attack of September 11, 2001, although there were many victims, hospitals in lower Manhattan were not overwhelmed by critically injured patients. The reason is that most victims died at the scene of the attack, with relatively few injured survivors and even fewer critically injured survivors.

Roccaforte and Cushman also describe a system for classifying disaster events from the hospital perspective by location (internal or external) and speed of onset (rapid or slow). An internal disaster is one that happens within the hospital and affects its infrastructure, such as flooding or an electrical failure. An external disaster is one that occurs outside the hospital but places unusual demands on it; an example is the terrorist attack on the World Trade Center on September 11, 2001, which placed unusual demands on hospitals in the area. Bombings and terrorist attacks are examples of rapid onset events, while infectious epidemics generally have a slow onset. One important difference between fast and slow onset events is that in the former, the hospital must have a plan in place to respond to the event and sufficient local capacity that can be rapidly mobilized, while in a slow onset event, the hospital has time to develop a response, adjust resource use, and acquire outside assistance.

Terrorist Attacks

The demands placed on the medical system after terrorist attacks differ from anticipated natural disasters or disease epidemics: The injuries produced by terrorist attacks are often technically complex, and hospitals near the scene can expect a rapid influx (a surge of patients immediately after the attack). For instance, after the 2004 train bombings in Madrid, Spain, in which 10 bombs were detonated during the morning rush hour, injuring over 2,000 people, the hospital nearest the bombing site received 272 patients in two and a half hours. In addition, most of the patients injured in a terrorist attack will require care from emergency departments already strained by their usual daily patient load.

The U.S. Centers for Disease Control and Prevention (CDC) has created guidelines to help health care providers at the local and community levels cope with the medical needs of victims of a terrorist attack. These guidelines outline seven areas of system-wide concern, given the current state of preparedness to deal with the medical consequences of a terrorist attack. These areas of concern are organization and leadership (such as the lack of specific roles and responsibilities during an emergency), alterations in standards of care (no universal agreement exists for altering standards of care during an emergency in order to achieve the greatest good for the entire community), education (disaster response is not a standard subject in nursing and medical school curricula), communications (despite the common agreement that good communications are essential during an emergency, communications failures are common during and after disasters), transportation (including transportation of personnel and equipment as well as patients), infrastructure and capacity (including personnel, equipment, and supplies, information technology, costs, and interoperability), and potential bottlenecks in clinical care (including radiology, critical care, pharmacy, triage, and legal issues). The CDC guidelines also include discipline-specific recommendations for emergency medical services, the emergency department, the surgical and intensive care unit, radiology, the blood bank, hospitalists, and administration.

Hospital Preparation for Surge Events

Kobi Peleg and Arthur L. Kellerman note that the U.S. federal government spent over $8 million on disaster preparedness between 2002 and 2008, but they criticize the resulting preparations because they were focused on responding to bioterrorism attacks and pandemic influenza, which would produce a relatively slow surge of patients (over days or even weeks); such preparations leave hospitals unable to cope with mass casualty events such as terrorist bombings, which produce a large number of victims with complex injuries in a short period of time. Peleg and Kellerman also charge that hospital surge capacity in the United States has diminished (as of 2009), as the terrorist attacks of 2001 become more distant memories.

A 2006 report by the Institute of Medicine identified numerous problems with emergency care in the United States, including crowding in Emergency Departments, frequent ambulance diversion (to other hospitals), boarding of Emergency Department patients in hallways, and declining numbers of subspecialists willing to handle emergency and trauma cases. These conditions inhibit a hospital's ability to respond to a surge event because the hospital is already overloaded with its usual load of cases. A 2008 survey of Level 1 trauma centers in seven U.S. cities, conducted by the House Committee on Oversight and Government Reform, also indicated that the United States could have serious deficiencies in hospital surge capacity. The seven cities included in the survey were all considered to be at risk for a terrorist attack, yet their hospitals were so overcrowded with their usual patient load that they were judged to be unable to respond to the demands of a large-scale terrorist attack.

Peleg and Kellerman cite the example of Israel as a model for the United States of how to prepare for sudden surges in demand for care. Both countries provide technically sophisticated hospital care, they argue, but hospitals in Israel, unlike those in the United States, are constantly aware of the possibility that they may need to respond to a sudden surge in casualties. Peleg and Kellerman cite 14 principles developed by the Israeli Ministry of Health to enhance hospital system surge capacity:

- *National coordination of resources:* In Israel, planning and coordination are handled by the National Supreme Health Authority, which is chaired by the director general of the Ministry of Health and includes representatives from the military and the country's largest sick fund.
- *Establishment of goals:* Each hospital is required to be prepared to handle a surge capacity of 20 percent of its usual bed capacity.
- *Standard operating procedures:* The Ministry of Health provides a national doctrine including operating procedures for different types of surge events.
- *Monitoring surge capacity:* Each hospital is required to file a daily report including bed capacity, occupancy rates, and patients on ventilator support.
- *Designing expandable facilities:* Hospitals are designed so capacity can be expanded quickly, for instance by installing power and oxygen lines in interior corridors, so they could be quickly adapted for patient care in case of a surge of patients.
- *Avoiding Emergency Department crowding:* Patients are promptly moved out of the Emergency Department and into the hospital, or into a temporary space, so that the Emergency Department is available to provide emergency care.
- *Establishing a system to clear Emergency Departments if necessary*: Emergency

medical services are coordinated at the national and regional level, and have radio connections to every hospital in the country. If a mass casualty event occurs, the nearest hospitals are notified, and they can clear the Emergency Departments to receive the casualties, typically within 15 minutes, by admitting patients to inpatient care or, if they are stable, discharging them.
- *Reinforcing the medical workforce:* In the case of a surge event, physicians and other personnel who are not emergency specialists are trained to report to a staging area, to be deployed by the hospital's designated manager.
- *Establishing an adjoining site to treat the less severely injured:* This is typically a temporary clinic near the Emergency Department that can handle patients with minor injuries and those suffering only psychological trauma.
- *Having a system to direct the injured in a mass casualty event to several hospitals:* To prevent overwhelming any hospital, severely injured patients are distributed among several nearby hospitals, as directed by an emergency medical services (EMS) supervisor on the scene.
- *Having an EMS liaison at each hospital:* During a mass casualty event, EMS sends a liaison to each receiving hospital to assist in communications between the hospital and the EMS control center and to keep the control center informed of the hospital's ability to accept patients.
- *Creating a triage hospital:* If the hospital nearest an event is overwhelmed with cases, it becomes a triage hospital focused on stabilizing patients who will be treated elsewhere.
- *Frequently conducting mass casualty drills:* Every hospital conducts an annual emergency response exercise, as ordered by the Ministry of Health, and the hospital's response is evaluated by personnel from a different hospital.
- *Continually maintain surge capacity.*

Peleg and Kellerman note that several aspects of the U.S. health care system impede the country's ability to maintain effective surge capacity. One is the fragmentation of the U.S. system, with care provided and paid for by many different sources; this impedes efforts to establish any standard approach for responding to a mass casualty event. Another is lack of national authority in the United States to require hospitals to maintain surge capacity; instead, this is largely a voluntary action. A third is the competitive nature of different entities in the U.S. system, which makes them less inclined to share information. The history and current situation of Israel also make it a special case, but that nation's example does demonstrate that it is possible for a country to maintain a high standard of ordinary hospital care while also maintaining surge capacity to respond to sudden increases in the demand for care.

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See Also: Earthquakes; Emergency Medicine; Fires; Floods; Health and Medical Response Scenarios; Hurricanes, Typhoons, and Cyclones; Infectious Disease; Suicide Bombing; Terrorism; Trauma.

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Sustainability

Sustainability is derived from the verb *to sustain*, which means to support, to provide for, to maintain, or to keep going. It is used synonymously with sustainable development. Sustainable development has been defined by the World Commission on Environment and Development as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

Some schools of thought hold the view that since development causes the depletion and degradation of the natural environment, the use of the term *sustainable development* is contradictory, as the depletion and degradation of the natural environment is not sustainable. This school of thought prefers the use of the word *sustainability* instead of sustainable development. Sustainability is focused on the three bottom lines: environment, society, and the economy. On the environmental front, it implies living within the carrying capacity of the ecosystem while improving the quality of human life. It is about surviving in the longer term, environmentally, economically, and socially.

The earth has a finite capacity to continue to provide humanity with the resources it needs, and also to absorb the resulting wastes. Currently, humanity is living unsustainably, as we are using up the earth's resources at a rate higher than the rate at which they are being replenished. Unless this trend is reversed, humanity could be faced with a cataclysmic crisis of not being able to meet needs in the nearest future. Since the industrial revolution of the 20th century, the increases in population and standard of living have led to increased depletion of natural resources. The use of fossil fuel, which has driven the industrial revolution, has also led to human-induced greenhouse effects with resultant impacts such as extreme weather conditions and sea level rise, resulting in flooding, drought, water scarcity, and food security crisis.

There are also fears of energy crisis in the future as we gradually begin to run out of fossil fuel. Also, depletion of existing natural resources like oil and gas, fresh water, and a host of others can greatly increase the likelihood of conflicts and resource wars, especially when these resources exist across political boundaries. To avoid these impending future crises and ensure environmental security, there is need for a global consensus and commitment to sustainability. Current unsustainable patterns of production and consumption by humanity, especially in the developed nations, must be reversed before it becomes irreversible.

Correcting Unsustainable Patterns

Reversing the unsustainable patterns of production and consumption of Earth's scare resources will be a social challenge that entails corporate governance, human rights, culture, ethical consumerism, and individual lifestyles, among other factors. Economically, humankind is expected to efficiently manage the earth's increasingly scarce resources while ensuring positive social and ecological outcomes. Economic sustainability takes into account the social and ecological consequences of market behavior.

Individuals, businesses, governments, and nongovernmental organizations all have to play a part in ensuring a sustainable future. Businesses must consider their environmental aspects and impacts and integrate the social and economic dimensions of their processes and performance with ecological concerns. For corporate sustainability (capacity to remain in business over a long period of time), businesses must focus on the triple bottom line. They must integrate their financial success and social legitimacy with effective and efficient use of ecological resources. Currently, there is an increasing expectation among stakeholders that businesses address sustainability issues in their activities to be able to maintain and improve their corporate reputation. It has become a key characteristic that organizations use in crafting their corporate image and reputation, particularly with increasing environmental awareness among stakeholders and the general public. Sustainability is now considered by many organizations as a business opportunity and no longer a luxury. The preconception of sustainability being expensive is now outdated. When fully integrated into the corporate business strategy, it minimizes potential losses and exploits new and emerging business opportunities from the global sustainability agenda.

Taking steps to reduce environmental, economic, and social impacts of business processes delivers significant cost savings, which maximizes profit. The consuming public is increasingly concerned with how organizations address sustainability issues. Its choices of products and services are affected by perceptions of the sustainable image of the organizations. Those who fail to adopt and demonstrate sustainability will ultimately price themselves out of the market (market sustainability). In a sustainable economy, only the environmentally responsible and those who provide positive socioeconomic benefits to the society will ultimately survive. Hence, for businesses, sustainability and the development of a strong sustainability framework are becoming the way to go in the pursuit of responsible growth and development.

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See Also: Climate Change Adaptation; Deforestation; Drought; Food Security; Overpopulation; Reputational Risk.

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T

Terrorism

Terrorism is the specific and planned use of unlawful violence or threat of unlawful violence to create fear among a specific audience, usually governments or societies, with the goal of causing a change in a system. Terrorism can take many forms, including domestic, foreign, bioterrorism, cyberterrorism, ecoterrorism, and narcoterrorism, to name just a few examples.

Domestic Terrorism

Research by Laura Dugan, Gary LaFree, and Heather Fogg in 2006, as well as Albert J. Jongman in 1992, has shown that the majority of terrorist acts that take place around the globe can be classified as domestic terrorism. Domestic terrorism is characterized as terrorist acts that take place by individuals acting within their own country in order to attack or harm their own people. These acts can be against organizations, police forces, the military, institutions, or other targeted aspects of the area in which the terrorists operate.

Domestic terrorism is not a phenomenon only in the United States. The Irish Republican Army (IRA) is an organization that dates as far back as 1921 and the Irish War of Independence. However, from 1969 forward, the Irish Republican Army splintered into several different groups. The IRA's connection with domestic terrorism stems from the acts of the Provisional Irish Republican Army. Based primarily in Northern Ireland, the IRA was known for utilizing terrorist acts in order to violently protest the treatment of Catholics in Northern Island, as well as emphasizing the importance of Ireland being without British influence and instead controlled by the Irish. The IRA is connected with numerous acts of domestic terrorism, including Bloody Friday, the 1972 bombing in Belfast that killed nine people and injured 130, and a 1998 car bombing in Northern Ireland that left 29 people dead.

The Subway Sarin Incident refers to an act of domestic terrorism in Japan on March 20, 1995, which has been considered the most serious attack to occur in Japan since the end of World War II. Members of the group Aum Shinrikyo released the chemical sarin on several lines of the Tokyo Metro subway system. The five coordinated attacks resulted in 13 deaths, 50 injuries, and nearly 1,000 individuals reporting temporary problems with their vision resulting from contact with sarin.

International Terrorism

Foreign terrorism has drawn increasing amounts of public and academic attention in recent years. Foreign terrorism refers to terrorist acts stemming from individuals or organizations from another country, often in order to make a statement about or to change policy in another area of the world.

Case Studies in Domestic Terrorism

There are several well-known domestic terrorism attacks that have taken place in the United States. The following cases are examples of some of the most severe in their respective categories.

Alfred P. Murrah Federal Building

The 1995 bombing of the Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma, was widely considered to be the most famous and destructive act of either foreign or domestic terrorism within the United States until the September 11 attacks. On April 19, 1995, a bomb detonated by Timothy McVeigh resulted in the loss of 168 lives, with 680 additional reported injuries. The Oklahoma City Bombing is said to have caused around $652 million in damages to the city.

Bhagwan Shree Rajneesh Poisoning

A religious community known as the Bhagwan Shree Rajneesh purchased a large ranch in Wasco County, Oregon, in 1981. The Rajneesh comprised almost 7,000 followers on the 100-square-mile ranch south of town. The cult members incorporated their commune as a city. When the construction of the commune ran into problems, members of the community saw the upcoming elections as an opportunity for the Rajneeshees to obtain permits and reduce opposition so that their plans could move forward. In order to win the county election, the Rajneeshees planned to infect a good portion of the population (at a place where most Wasco County voters live) with a foodborne illness, specifically salmonella. A total of 751 persons were struck with salmonella gastroenteritis associated with eating or working at area restaurants. The outbreak occurred in two waves from September 9 through 18 and September 19 through October 10. The majority of cases were associated with 10 restaurants. The infections occurred though the intentional contamination of lettuce in the local grocery store. The Rajneeshees went on to contaminate restaurant coffee creamers and blue cheese dressing, along with fruits and vegetables at restaurant salad bars. To date, the episode still remains the most widespread bioterrorism attack in U.S. history.

Public Response to Terrorism

Terrorist attacks generally attract a great deal of news coverage because they are crisis events. Crises are marked by high levels of potential danger, such as loss of life; a fast response by the authorities to counteract the potential threat; and being unanticipated events that throw off the everyday patterns of life—and terrorist events fit that characterization. Because of their unanticipated nature, terrorist events cause a great deal of fear and uncertainty. This is further exacerbated because there is also a high level of danger and risk that accompany such events. People's lives are at stake. The outcomes of the events are incredibly important, which increases people's incentive to find information that can help predict future events. However, research suggests that people do not panic at the onset of such an event; rather, they act in rational ways. These behaviors can include information seeking, media monitoring, helping others, and getting to safety. Some of these behaviors also have the benefit of being a coping mechanism to aid individuals in surviving the event.

Additionally, a function of crisis management is to help people prepare for and respond to a terrorist event. Training drills and exercises for a terrorist event tend to take the form of exercises or drills or informational seminars. These events are usually sponsored at the local-government level, by local emergency response teams, or even at the building management level. Much of the success of evacuating the World Trade Center in 2001 is credited to emergency management and evacuation procedures established after the 1993 World Trade Center bombing.

Seminars are another management opportunity for planning and responding to a terrorist. They also pull together a diverse group of people to talk about potential responses to emergencies. This diverse group should encourage new ideas and shared experiences to come together for better planning.

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See Also: Biological Weapons; Chemical Weapons; Cyber Warfare; Evacuation; Foreign Policy Crises;

Hijackings; Land Mines; Nuclear and Radiological Weapons; Post-Traumatic Stress Disorder; Religious Violence; Sabotage; Shelter-in-Place; Suicide Bombings; Transportation Security; Uncertainty; Weapons Trafficking.

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Threat Detection

In today's dynamic, high-velocity social and business environment, most crises do not occur suddenly. Ian Mitroff observed that long before its actual occurrence, a crisis sends off a repeated and persistent trail of early warning signals that could be picked up by a threat detection mechanism at a time when there is still opportunity to prevent it from occurring. Still, evidence from the best-known crises in the last 50 years (e.g., Bhopal, *Exxon Valdez*, *Challenger*, *Columbia*, 9/11, the Mumbai attacks, Fukushima, Costa Concordia) shows that the organizational threat detection mechanisms are often inadequate.

Warning Signals

Among the first scholars to point out the significance of inadequate threat detection was Barry Turner, with his disaster incubation theory. According to Turner, disasters are caused by the accumulation of events that are at odds with organizational norms about safe operation by a multiplicity of minor causes, misperceptions, misunderstandings, and miscommunications accumulated during the disaster incubation period. These events remain unnoticed because of a range of communication errors, which he identifies as signals known and ignored or distrusted, signals buried or distributed across the organization and hence not collated; and what he calls "organizational exclusivity," when the organization ignores warnings coming from outsiders.

These signals can be any kind of information (qualitative or quantitative) that indicates a deviation from normalcy and can be interpreted as symptoms or peaks in the development of a crisis. In an organizational context, these can, therefore, be viewed as messages or pieces of information about anomalies (discontinuities) generated by "organizational imperfections" (e.g., failures, breakdowns, errors, incidents, near-accidents, unintentional deviations) in the external (e.g., poor quality of raw materials offered by the organization's suppliers) and/or the internal environment of the organization (e.g., a steady increase of employee absences).

Threat Detection Process

The threat detection process is often understood as involving activities grouped into two categories: (1) activities triggered by a need to define warning signals (identifying potential signals, locating data in these signals, and transmitting the signals) and (2) activities triggered by a need to resolve a potential crisis (interpreting the threat signals, stabilizing the potential crisis, planning a method to avert the crisis, and resolving the crisis). It can therefore be perceived as a multistage dynamic process that aims at the timely scanning for external/internal threat signals, their capture, and their transmission to the organization's incident response center, which, interpreting the information they carry, will decide about potential preventive action.

The threat detection process should have "interim goals" that exist at each stage of the detection process and "eventual outcomes." The first goal is the creation of a shared understanding about the situation and of a consensus for a commitment to the crisis response activities. The second is the establishment of accountability with regard to these response activities, and the third is the reduction of key organization members' uncertainty by creating awareness about the emerging crisis. The eventual outcomes of the process will be changes in the organization's core beliefs about its vulnerability to certain threats and in the procedures and structures for threat detection.

Threat Detection Pathologies

Even though threat signals may nearly always precede crises in an organization, there are many factors, not related to the design of the threat detection mechanism per se, that may influence the ability of the organization to detect and correctly interpret these threat signals. These threat detection failures normally fall into four categories: scanning, integration, interpretation, and learning.

Threat scanning failures: Threat scanning failures occur when the detectors fail to capture all signals emitted by the threat source. This failure may be attributed to lack of ability; however, the crisis management literature identifies other reasons such as background noise, information overload, and selective attention.

When the background noise of a signal is high, detectors often find it difficult to distill cogent threat signals that will indicate the nature of the crisis. On the first day of Hurricane Katrina, the operations center received at least nine reports of levee breeches and eight other reports of major flooding. However, at the same time, the Army Corps of Engineers insisted that there were no levee breaches, and the Federal Emergency Management Agency (FEMA) was claiming that it was coping. With several communication gaps resulting from the hurricane itself, the command center could not really understand which signals were genuine and which not.

Information overload can be a cause for threat scanning failure, as detectors that are overwhelmed with signals may not be able to process them all and choose to ignore those signals that they consider of lower priority. For example, in 1941, U.S. analysts were inundated with signals that a Japanese attack was imminent. However, knowing that torpedoes needed a significant depth of water to arm themselves, they considered an attack on Pearl Harbor "low priority" and concentrated their limited resources on analyzing other possible targets. What they did not know was that the Japanese had developed torpedoes for shallow waters.

One more factor that may lead to threat scanning failure and is often linked with information overload is a form of self-imposed censorship where beliefs about what is possible and what is not lead the detectors to ignore certain signals and focus on certain others. Disasters such as the nuclear reactor accident at Three Mile Island and the downing of an Iranian airliner by the crew of the U.S. missile frigate *Vincennes* showed that both the control room operator on duty in the former and the radar crew member in the latter focused their attention on the "wrong" signals and, consequently, chose the wrong course of action. This type of signal bracketing is called "selective attention," and it is normally related to the detector's background, history, and previous commitments, and with the prominence of some threat signals.

Signal integration failures: More often than not, threat signals are detected and transmitted but not integrated in the "big picture" and therefore never interpreted correctly. This is often caused by functional silos in an organization, a consequence of seeking to create deep pools of expertise in several functional areas and failing to integrate them. A perfect example of such "silo mentality" is the way that fragmented information about the terrorist attack on the Twin Towers was available but never shared among the various agencies that possessed it.

It is noteworthy, however, that quite often organizations create information "firewalls" within themselves when some threat signals detected in the environment are deemed too sensitive to be broadly shared or certain channels for transmission of such signals are cumbersome to use. This secrecy or overzealous guarding of information may result in tragedies.

In the case of the massive shootings at Virginia Tech in May 2006, both the silo mentality and the cumbersome transmission of sensitive information exacerbated a crisis into a tragedy when it could

A security policeman and bomb-sniffing dog sweep a portion of the Lower 9th Ward in New Orleans, Louisiana, on November 5, 2005, prior to a visit from Prince Charles and Camilla Parker-Bowles of Britain. Hurricane Katrina hit the area August 29.

have been prevented. The Virginia Tech Review Panel, in its report, highlighted the silo effect, stating that no one (within the organization) effectively joined up all of the dots and emphasized the lack of information sharing among academic, administrative, and public safety entities at Virginia Tech, and the students who had raised concerns contributed to a failure to see the big picture. The report also pointed out how "secrecy" made the process for sending an emergency message cumbersome, untimely, and problematic since, although the campus police had the authority to send such a message, the relevant enabling codes resided with others within the university.

Interpretation failures: Another issue that may arise is disagreement on the interpretation of the signal between the various decision makers. A timely appraisal and interpretation of the signal requires a critical mass of competent decision makers who share strong ideas about what is important and what is not, something that is not usual in complex organizations. In these situations, the definition of the unfolding crisis and its causes remain contested, and efforts to develop a crisis response are likely to involve much trial and error, rearguard infighting, political U-turns, and symbolic gestures. On the other hand, excessive homogeneity and conformity among decision makers leads to the phenomenon of groupthink, hindering the "out of the box" interpretation of signals, which is often necessary for newly emerging crises. All this becomes more complex when multiple organizations get involved in the interpretation of signals. The success of signal interpretation will depend on the degree of connectivity between the organizations involved as well as on the intellectual capital of the decision makers.

In the case of the Indian Ocean tsunami, although the earthquake that caused the tsunami was detected, the sparse seismographic coverage of the Indian Ocean contributed to a severe underestimation of its size, and the lack of real-time sea-level data made it impossible for the tsunami to be verified before it had already impacted the countries most severely affected. On the other hand, there were no communication networks established to disseminate a warning to the Indian Ocean communities, and because these communities were not adequately trained for such an eventuality, they were unable to recognize the natural indicators of an approaching tsunami (for example, sudden recession in the sea level) where they were evident.

Learning failures: The importance of learning from own and others' experiences is highlighted in many crisis management models, such as Mitroff's five-stage crisis management model. However, some organizations fail to learn from these experiences because they not have established the mechanisms needed to formalize, codify, and share the lessons learned. This will inevitably lead detectors not to capture again threat signals that they have missed in the past. The report for the Buncefield depot accident in 2005, for example, clearly shows that Total has not learned any lessons from similar accidents, such as BP's Gulf explosion, and failed to identify warning signals that could have led to the prevention of the disaster.

Learning failures, however, may also be caused by "cognitive arrogance." In certain cases, cherished traditions, past successes, and internal politics may make the organization look more inward rather than outward, shutting out any threat signal that might lead to discrepant information even if in the past similar threat signals led to a crisis. A long series of successes may lead the decision makers into believing that they may not make mistakes. This attitude of omnipotence may become very dangerous for the organization and its constituents. The 2008 financial crisis and the collapse of organizations such as Lehman Brothers and Washington Mutual are examples of cognitive arrogance.

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See Also: Crisis, Definition of; Incident Response; Information Asymmetry; Information Vacuums; Mitroff's Five Stages of Crisis Management.

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Tornadoes and Severe Thunderstorms

Each day, there are at least 40,000 thunderstorms taking place around the planet. The worst of these are severe thunderstorms that pose multiple challenges to crisis managers because of the associated hazards that can include lightning, hail, wind gusts, and tornadoes. Each of these threats is often accompanied by the element of surprise and affords a small window of opportunity for making decisions that will reduce destruction, injuries, and the loss of life.

The National Weather Service (NWS) classifies a thunderstorm as severe when it contains three-quarter inch hail and/or has wind speeds of 58 miles per hour (mph). The Storm Prediction Center (SPC) in Norman, Oklahoma, is the branch of the NWS tasked with issuing severe storm and tornado advisories for the entire country. Most watches tend to last four to six hours and are designed to make the public aware of the potential for severe weather. If a severe thunderstorm develops or a tornado is spotted, the local weather forecast office of the NWS issues a warning to seek shelter.

Lightning

Each year in the United States, there are about 25 million lightning flashes, and lightning remains one of the top three thunderstorm-related killers, along with floods and tornadoes. On average, some 54 people are killed by lightning each year, and hundreds are permanently injured with debilitating disorders. Approximately 70 percent of all injuries and deaths from lightning occur in the afternoon. Florida is the thunderstorm capital of the United States and leads the nation in lightning fatalities, with 463 reported deaths between 1959 and 2011, followed by Texas with 212 fatalities during the same period. Lightning can strike as far as 10 miles away from a thunderstorm, so to avoid being struck, one must remember that if thunder is audible, lightning is also close enough to strike. Lightning is also responsible for igniting wildfires that burned more than 8 million acres across the United States in 2011 and continue to threaten property and lives as the frequency of extreme drought events related to climate change increases.

Hail

Severe thunderstorms are capable of producing hail the size of a stone, dependent on the time spent in a cloud and, thus, the severity of the storm. Approximately 40 percent of severe hailstorms in the United States take place between the hours of 3:00 P.M. and 6:00 P.M. To date, the largest recorded hailstone fell in June 2010 at Vivian, South Dakota, with a diameter of 8 inches and weighing nearly 2 pounds. Cheyenne, Wyoming, is the hail capital of the United States, with an average of nine hailstorms a year. Although hail does not pose the same risk of injury or death as lightning, hail can cause significant property damage to automobiles, airplanes, and windows. The main threat from hail is to crops such as wheat, corn, and soybeans, with annual losses representing about 2 percent of all U.S. agricultural output.

Wind Gusts

Severe thunderstorms are capable of producing extreme wind gusts in the form of straight-line winds and downbursts. Straight-line winds can reach speeds of 100 mph and extend for hundreds of miles. Unlike tornadoes that scatter debris in a rotational fashion, straight-line winds leave a forward path of destruction. A rare super *derecho* (Spanish for straight-ahead) raged for 12 hours over an area from Indiana to the mid-Atlantic coast in July 2012, leaving behind 700 miles of devastation as the SPC received some 600 reports of damaging winds, and wind gusts as high as 91 mph were recorded. Downbursts are localized downdrafts that exit the base of a severe thunderstorm, striking the ground and spreading out horizontally. If the diameter is less than 2.5 miles, it is referred to as a microburst. Microburst wind speeds can reach 160 mph and pose the greatest threat to aircraft, as was the case with Pan Am Flight 759, which encountered a microburst on take off and crashed, killing 153 people in 1982.

Tornadoes

The most frightening element of a severe thunderstorm is the tornado. Theodore Fujita of the University of Chicago developed a scale to measure the severity of tornado damage that ranges from F-0 to F-5, with the latter representing *incredible* damage and wind speeds up to 318 mph. An F-5 tornado struck Oklahoma City in 1999 with the highest wind speeds ever recorded at 318 mph, resulting in an additional F-6 category that represents *inconceivable* wind speeds greater than 318 mph. An Enhanced Fujita Scale (EF Scale) was adopted in 2007 and considers any tornado with wind speeds greater than 166 mph to be considered *violent*. About two-thirds of all tornadoes form between the hours of 2:00 P.M. and 8:00 P.M., with the majority occurring between April and July. Texas has more tornadoes than any other state, followed by Oklahoma and Florida. The number of tornadoes has nearly doubled since 1950, with 1,700 confirmed tornadoes recorded in 2011. From 1950 to 2005, property damage from tornadoes topped $20 billion dollars and, despite better forecasting techniques, the death rates continue to rise. The 30-year average from 1982 to 2011 was 74 deaths per year, and the 10-year average from 2002 to 2001 was 108. However, in 2011, there were 553 fatalities from tornadoes.

Among the challenges for officials is addressing the complacency that can accompany warnings that never materialize. Recently, the SPC has started giving high-risk 24-hour warnings and referring to storms as catastrophic and life-threatening in order to encourage the public to take precautionary measures to mitigate the damage from these uncontrollable natural crises.

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See Also: Climate Change Adaptation; Disaster Risk Reduction; Emergency Alert System; Floods; Fires; Preparedness; Warning.

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Training

Crisis events expose staff to demands that are suddenly occurring and often beyond the normal experience of most individuals. Differences between normal and crisis events (such as uncertainty, coordination problems, and infrastructure losses) renders routine training, experience, and operational practices less applicable as a foundation for effective crisis response. Consequently, crises require people to apply their normal skills in atypical circumstances (such as search and rescue in disaster contexts) and/or create a need for new work competencies, relationships, and procedures to deal with novel circumstances (such as multidisciplinary teamwork). Training is tasked with adapting existing competencies; developing the unique knowledge, skills, and relationships required for effective crisis response; and providing experience in applying these competencies in unfamiliar circumstances in ways that increase people's capacity to respond to crises.

The process commences with training needs analysis (TNA). Crisis TNA includes expert reviews and techniques such as critical incident and decision methods, goal directed task/information analysis, theater-based interagency training, applied cognitive task analysis, means end chain analysis, and goal hierarchy analysis. These analytical techniques identify the demands and operating environment characteristics staff may have to contend with. Once these demands are identified, TNA articulates the response roles, competencies, knowledge, procedures, and relationships required to effectively confront them. The analysis of contexts and the competencies required for effective functioning provide a foundation for the design, development, delivery, and evaluation of the training content, exercises, and simulations that will be used to develop the capacity of staff to adapt existing competencies and/or apply crisis-specific competencies in scenarios that are comparable to those that could occur in crisis events.

Training needs analysis will identify all the events organizations could experience (for example, transportation accidents, workplace accidents, assaults, homicide, suicide or attempted suicide, armed robbery, hostage taking, and natural disasters, such as floods or earthquakes) or environmental events (such as gas leaks and toxic waste spills, industrial disputes, and acts of terrorism) to ensure that training supports developing an "all-hazards" capability. Training needs analysis also articulates the crisis event characteristics staff must prepare for. These include responding to events that occur without warning and that require a capacity to transition to (and from) crisis management procedures promptly. Training develops people's ability to function in conditions characterized by uncertainty, ambiguity, and personal threat under high physical and time pressures, and possibly under conditions of media and public scrutiny. Training facilitates people's appreciation of the need to take on higher than usual or expected responsibility and how resource constraints limit opportunities for effective action. Training prepares staff for working in a crisis environment in which they will experience higher than usual physical, mental, and emotional demands and psychological stress (possibility over prolonged periods of time). To these factors can be added a need to interact effectively with people from departments or professions staff would not normally work with. To prepare people for all such eventualities, a holistic approach to training is essential. This can be accomplished using an assessment and development center approach.

Assessment Centers

Assessment centers involve participation in multiple exercises and simulations as well as the observation and evaluation of performance against predetermined task-related behaviors by a team of trained assessors in an environment (developed from TNA) that represents the conditions in which performance will occur. The use of multiple, expertly evaluated assessments (such as personality, role play, leadership, and decision making) and simulations allows roles, tasks, and specific skills to be developed and practiced individually and collectively in ways that provide participants with opportunities to integrate experiences and develop a more holistic appreciation of the overall crisis management role.

Simulations provide a practical context for experiential learning in which staff can develop, adapt, and apply knowledge to goal-directed actions in realistic circumstances. Simulations afford opportunities for people to develop, review, and rehearse technical and management skills under realistic circumstances; practice dealing with high-pressure situations in a safe and supportive environment in the roles they will adopt in a crisis situation; and receive feedback on their performance. In doing so, they use and develop competencies such as tacit knowledge. Simulations expedite the development of generic competencies such as tacit knowledge, self-efficacy, individual and team (shared) mental models, information management, situational awareness, decision making, and multidisciplinary/multi-agency team processes that are pivotal to effective crisis response.

Tacit Knowledge

Training needs analysis identifies preexisting competencies that are applicable to crisis response. However, much of this knowledge is implicit or taken for granted. This is called tacit knowledge. Tacit knowledge underpins people's ability to adapt to and respond to real-world environments and is therefore an important determinant of effective performance in challenging and dynamic crisis events. Training activities assist staff to identify and apply this tacit knowledge to crisis response.

Expertly evaluated exercises and simulations facilitate the development, consolidation, and application of factual and procedural knowledge (knowledge regarding how to perform activities). They do so by allowing participants to witness connections between various bodies of knowledge and by giving them structured and evaluated opportunities to practice utilizing existing tacit knowledge relevant to effective crisis response. Simulations also provide an experiential learning context that enhances the development of tacit knowledge through an emphasis on selective encoding (important for situational awareness), selective comparison, and selective combination (combining information in goal-directed ways). The latter facilitates the development of situational awareness and adaptive response in environments characterized by incomplete, ambiguous information.

Situational Awareness

Situational awareness is a key facet of effective crisis management. Situational awareness describes people's ability to identify critical elements in the crisis environment, integrate elements in ways that allow meaningful activities to be selected in the light of salient goals, and anticipate future demands and the actions required to manage them. The rarity of crisis events means that training is required to develop situational awareness. By identifying crisis characteristics and demands, TNA informs the development of assessments (decision making and leadership), exercises, simulations, and decision-support systems (such as BeAware and AKTiveSA) required to develop the ability to identify environmental cues that indicate new or emergent goals, and provide training in applying these interpretive skills in the kinds of high-pressure contexts staff could find themselves in.

Training that develops situational awareness supports developing decision-making competencies such as naturalistic decision making (recognition-primed decision making). The effectiveness of naturalistic decision making is a function of gaining experience in simulations that broaden exposure to crisis characteristics and provide a learning environment to increase the range of options (mental models) that can be matched to actual event circumstances. Situational awareness provides the foundation for effective response. Training also functions to ensure that people can act on it. A key determinant of this is self-efficacy.

Self-Efficacy

Self-efficacy underpins people's ability to organize and execute courses of action required to achieve objectives or perform in specific ways and to persist in task performance in challenging environments. Self-efficacy is developed through direct and vicarious experience (such as behavioral modeling), from observing the successes and failures of others on particular tasks, and from feedback on performance. Assessment centers provide opportunities for behavioral modeling by including multiple participants in simulated crisis events modeled on the event characteristics elicited in the TNA. Crisis response can also necessitate a need to work in conjunction with others.

Interorganizational Issues

The challenge of comprehending and managing complex, dynamic crises requires staff to be able to access data from diverse sources and work with these sources to implement actions. Because this can involve representatives of departments, professions, and agencies that rarely interact together under normal circumstances, training is required to develop interdisciplinary and multi-agency competencies in areas such as information

Case Study: Training Exercise and Training Needs Analysis

In the course of developing its emergency management capability to deal with crisis events such as mass emergencies and disasters, a council established an emergency operations center (EOC). Staff members who would fill crisis management roles in the EOC were selected on the grounds of their managerial experience, but a need for a specific training program to develop individual and team competencies was identified, particularly with regard to a need for high levels of competence in information sharing and management and decision making involving EOC members and external agencies in the kinds of high-demand, high-stress environments in which the team could operate.

To identify the specific areas training would need to cover, a training needs analysis (TNA) was developed. This TNA comprised two general components. Interviews and focus group meetings with fire and police personnel with experience of managing crisis events provided input into scenario design. This input, together with that from utility company experts, informed the development of an exercise that was run in real time. It involved managing the first eight hours of a simulated gas explosion that had significant implications for the whole city. The proximity of the explosion to a built-up area (including schools, businesses, and a shopping center) and the fact that the ensuing fire occurred in the vicinity of a pipeline transporting gasoline to a fuel distribution center provided a context in which exercise participants had to anticipate and consider how they would manage possible event escalations.

Anatomy of the Exercise

The crisis started at 9.30 A.M. on a Tuesday. EOC staff members (30 in total) were not advised of the exercise beforehand in order to ensure that the exercise mirrored the experience of being called to manage a suddenly occurring event. The exercise included having representatives of key agencies (for example, gas, water, phone, refining and power utilities; local government; ambulance; fire; police; media; and politicians) who provided and requested inputs. Exercise injects had been prepared in consultation with these groups, and thus information from situation reports from several agencies on site as well as from others (such as welfare groups and schools) were fed to the EOC. The exercise was designed to reflect the high-demand characteristics that could accompany an actual crisis response. This included the call-out that required staff to switch from routine to crisis management roles, operating in a context in which they found themselves having to make sense of a large amount of information from diverse sources (such as information from those on scene, public information, and initial media reports) that included inconsistent and ambiguous input that was presented to them on arrival, and having to organize themselves into a team.

Additional demands were introduced at various points (for example, being presented with information that police were evacuating those in the surrounding areas to schools and these schools demanding where the children should be evacuated to). In addition to requesting input from external agencies, the EOC staff received input from these sources throughout the exercise. This provided the context in which information and decision management could be assessed under the high-stress conditions in which EOC staff had to work and understand the needs of groups with whom they had little contact under normal conditions. EOC processes and performance were evaluated by three experts who observed and reported on various aspects of team performance. This, together with a debriefing with exercise participants, was used to identify training needs. These processes identified several training needs. Some of these related to technical issues such as design of the software being used as decision-support systems and access to aerial photographs.

Analysis and Identification of Training Needs

The main objective of the evaluation was identification of personal and team development needs. The evaluation identified a need to develop competence in anticipating future demands and needs. Situational awareness was compromised by spending too much time on what had happened, and team members recognized the importance of better knowledge of the expertise in key agencies and requesting information on what would happen next so they could take a more proactive approach to managing the crisis. This called for training to include working with other agencies to better understand their roles and operating systems and needs. A need for stress management was recognized. Participants reported that the high demands associated with dealing with data from multiple sources increased stress and affected the quality of teamwork. Training in developing team roles in ways that facilitated technical performance and better social support emerged as a training need that could enhance performance and manage stress. Training in decision making under high-stress conditions (naturalistic decision making) and in conjunction with others who may not necessarily be in the same location (distributed decision making) were identified as key training needs. The evaluation identified how assumptions of being able to work as a team because participants worked for the same agency was inappropriate, and a need for training to specifically develop understanding of others' roles (team building) and how they related to crisis management processes and procedures emerged as a training need.

management and decision making. When simulation includes representatives from sources with whom personnel could interact, training facilitates the development of a capability to specify information needs, coordinate activities with other groups, interpret it appropriately on receipt, and, if required, adapt it for different functions and end users over time.

Training designed to facilitate this crisis management capability is widely used in the aviation industry, where it is referred to as crew resource management (CRM) and used to train air crew and those on the ground who are required to interact and perform effectively during crises. CRM training includes modules on communication, team building, stress and decision making, and, increasingly, the impact of organizational, professional, and national culture on these capabilities. Pre- and post-training evaluation studies of CRM training have shown significant improvements in knowledge of, attitudes toward, and performance of teamwork skills for both novice and experienced crews. The observed improvements in performance build on the development of team or shared mental models.

Team mental model training can be accomplished using techniques such as cross-training, which gives basic exposure to other team members' roles (via an information session, without actual experience in other team members' roles). Cross-training has demonstrated improvements in teamwork coordination compared with teams who did not receive cross-training. However, as levels of team member interdependence increase, particularly when performance occurs in multidisciplinary teams, higher levels of team training are required. This can be accomplished using techniques such as "positional clarification" (information is provided about other roles in the team), "positional modeling" (information and some practice in the other positions is provided), and "positional rotation" (all team members spend a significant period of time performing other team members' jobs). These approaches have demonstrated improvements in tactical decision tasks under high-workload and high-stress conditions. Other techniques, such as team adaptation and coordination training (TACT), develop competence in implicit communication (offering information in anticipation of another team member's decision needs) and contribute to improvements in performance, adaptive decision-making strategies, primary task performance, teamwork skills, and communication in crisis conditions.

Collaborative exercises and simulations that support the application of shared mental models and situational awareness facilitate the development of distributed decision making, which acknowledges that effective crisis response requires the contribution of people who differ with respect to their professions, expertise, functions, roles, or geographical locations. Simulations model how events evolve over time and provide contexts for people to develop their understanding of how their and others' expertise contributes to different parts of the same plan while working toward common goals over time.

Training for Stress Resilience

Crisis events increase the risk of adverse stress reactions that undermine performance and well-being. Training to promote stress resilience includes using exercises and simulation to help people construct mental models that facilitate their ability to make sense of the unique demands and psychological reactions associated with crisis response. Training provides staff with opportunities to practice dealing with high-pressure situations in a safe and supportive environment, increases awareness of stress reactions, and facilitates rehearsal of strategies to minimize negative reactions. Studies comparing indices such as heart rates in actual and simulated crises have found sufficient comparability to support the generalizability of training.

Feedback

Critical, expert assessment of performance is used to provide feedback, facilitate training evaluation, and identify future training needs. Feedback on the strengths and weaknesses in performance on individual and team exercises facilitates identification of areas of deficiency and why deficiency occurs in ways that enhance behavioral change, as well as providing a context for the iterative development of complex skills and their application in diverse crisis scenarios. In an assessment center, feedback is continuous (after each exercise) and thus facilitates skill development and reinforcement for appropriate behaviors.

The rarity of crisis events means that training should facilitate overlearning of tasks to reduce the risk of people reverting back to routine ways of performing under challenging circumstances. The value of training exercises and simulations rests with the degree to which they provide challenging learning experiences. It is only when operational assumptions are challenged in constructive ways that resilience and adaptability can be enhanced. Training and practice in diverse scenarios that address both specific content issues (for example, technical skills) and empower people to function in the context within which performance will take place (for example, long hours, lack of backup, and performance difficulties) facilitate people's ability to generalize their understanding in ways that contribute to promoting predictability, control, and adaptability and their ability to function across a range of crisis scenarios.

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See Also: Agency Notification and Mobilization; Crisis Communications; Crisis Information Management Systems; Decision Making Under Stress; Disaster Drills; Incident Management; Interoperability; Operational Plans; Response Team.

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Transportation Security

Transportation security is the oversight and provision of security services to transportation systems, especially security against criminal activity such as terrorism. In the United States, security of transportation systems is under the jurisdiction of the Transportation Security Administration (TSA), established in December 2001 as a response to the September 11, 2001, attacks. The TSA works with local and state law enforcement in overseeing security for airports, ports, pipelines, railroads, highways, and mass transit systems. Just as the Department of Homeland Security was established in order to put homeland security matters under a single umbrella as a response to the criticisms that the federal government mishandled intelligence that could have prevented the 9/11 attacks, the TSA was established to consolidate in a single organization the authority to develop and implement transportation security policies, with a particular focus on the prevention of aircraft hijacking and the use of transportation systems to bring terrorists and their equipment into the country. It is the sole federal authority in screening passengers and baggage for flights in matters not related to immigration or customs.

Changes After 9/11

Airports have the right to hire a private company to perform screening, provided it follows TSA-established procedures and the company is approved by the TSA. Covenant Aviation Security, for instance, based in Chicago, was founded in 2002 to provide security services to the aviation industry and almost immediately took over screening at the San Francisco International and Tupelo Regional airports. It later took on screening at the Sioux Falls Regional and Sioux Falls International airports and provides security services (such as personnel screening, security assessments, perimeter intrusion detection systems, and closed-circuit television monitoring) at the Orlando International, LaGuardia, and John F. Kennedy International airports. Other aviation security contractors include FirstLine Transportation Security, which provides screening services for Kansas City International Airport, and Trinity Technology Group, which provides such services for airports in Tupelo, Mississippi, and Sonoma, California, as well as security support at TSA headquarters.

Some Congressmen have supported further involvement of the private sector in transportation security and a greater reliance on contractors to provide screening and other services, but there have been several high-profile problems. The Department of Homeland Security's internal investigation discovered that at San Francisco International Airport, Covenant employees were tipped off by TSA employees about secret tests of their screening procedures; despite the investigation, no one was fired, and Covenant's contract was renewed. Another contractor, data analyst James Duchak, tampered with the TSA's Terrorist Screening Database when he was given two weeks' notice of termination; he was sentenced to two years in prison.

Other changes were made to transportation security after the September 11 attacks as well. Cockpit doors on newer aircraft are stronger and bulletproof, and few flights permit passengers to enter the cockpit during flight. Enhanced requirements were placed on passengers boarding flights—most passengers must provide a government-issued photo ID—and airport patrons who are not boarding a flight are no longer allowed beyond designated points, whereas in the past family and friends could accompany a departing passenger to the gate to see them off. The TSA's screening procedure has been enhanced, requiring scans or patdowns of most passengers at most airports, and limitations on which objects can be included in carry-on luggage. A single incident of explosives hidden in the shoes of Al Qaeda member Richard Reid in 2002 led to the requirement for passengers to remove shoes before boarding at all U.S. airports, even a decade later.

Federal Air Marshal Service

The Federal Air Marshal Service, which began operations in 1968, is a law enforcement agency operating under the TSA's supervision. Marshals are held to one of the highest standards of handgun firing accuracy in the federal government and are trained in close-quarters self-defense in addition to standard law enforcement techniques and methodologies because of their primary task of traveling incognito in order to detect and neutralize threats aboard aircraft. Until 1985, federal air marshals were deployed almost exclusively on domestic flights, in part because the service was formed in response to domestic hijackings and in part because of the reluctance of other countries to cooperate. This changed during the Ronald Reagan administration, when terrorists hijacked

TWA Flight 847 in 1985 after takeoff from Cairo. A U.S. Navy diver was tortured to death, and the rest of the passengers were held hostage for two weeks. The air marshal service was expanded as a result, and agreements were reached with foreign countries laying out guidelines for the handling of weapons and personnel.

The air marshal service was expanded vastly after the September 11 attacks. On that day, there were only 33 active air marshals. The number of marshals today is classified, but it is believed to be in the thousands, with many of the initial new hires coming from the Border Patrol; the Drug Enforcement Administration; the Bureau of Alcohol, Tobacco, and Firearms; and other federal agencies. The service was moved to the TSA in 2005 as part of a Department of Homeland Security reorganization.

During a joint training exercise at Dyess Air Force Base, Texas, base firefighters facilitate the efforts of Abilene regional airport firefighters in becoming proficient at extinguishing aircraft fires, a skill required by the Federal Aviation Administration.

Though called "air marshals," the marshals have since 2004 also been deployed by the TSA to mass transit systems on days considered to pose greater risks of attack: holidays, major events like the Super Bowl, anniversaries of terrorist attacks, and so on. This shift has generated considerable complaints; air marshals have complained that their anonymity has been compromised, since the goal of these deployments is a high-visibility security presence; transit operators and local law enforcement have complained that air marshals are unfamiliar with local procedures and norms. In 2011, air marshals were banned from Amtrak properties after alleged violations of local law and corporate policy in the conduct of their screening procedures.

There have been other complaints about the service as well. Given the rapid expansion, the quality of the training, especially in the case of marshals without previous law enforcement experience, has been called into question. A number of marshals have been discovered to have criminal convictions for misdemeanors, including sexual assault. The number of arrests the service has made has been very low—fewer than 10 per year—calling into question not only its efficacy but also its necessity.

Security Theater

Many of the enhancements to transportation security since the establishment of the TSA have been dismissed as "security theater" by security experts. *Security theater* is a term that predates the present discussion; it originally related to computer security but has proven more broadly useful: it is the practice of visible security measures that provide the feeling of security but little to no actual improvement, like a child hiding beneath the bedcovers (or under a desk, in the event of an atomic bomb). Much as World War II rationing provided a psychological benefit on the home front—independent of its tangible benefits in dealing with shortages and preventing inflation—by giving the general public a way of being involved in the war effort as part of their daily lives, so too have the drastic measures introduced in airport security served to constantly remind the flying public of the ongoing war on terror.

In its original sense, security theater was criticized because it was assumed that it was adopted in order to avoid more expensive security measures that would provide better protection. That argument is not always made with airport security theater. Beyond political gains, or the TSA's natural desire to remain and extend its operation, it could be said that the feeling of security is an end in itself, given the way national confidence was shaken after the September 11 attacks. It is difficult to establish that attacks have been prevented, after all, because if Homeland Security's goals were met, the number of attempted attacks foiled would be trivial compared to the number of possible attacks that were abandoned because security measures and other policies either dissuaded the would-be attackers or made the attack too difficult for them.

This is, in fact, the defense the Federal Air Marshal Service offers when its low arrest count is pointed out: if its presence on aircraft is an effective deterrent, that is both the expected result and the desirable one. If, then, other security policies have reduced the threat of terrorism, security theater would serve the end of providing a feeling of security to accompany that ephemeral gain.

Transportation Security Best Practices

Interagency partnerships are key to real transportation security. Federal, state, and local authorities need to share intelligence and pool competencies for the best protection with the least disruption to transportation. Unified threat management offers a comprehensive protection strategy, especially in tandem with a good interoperable communication system for emergency planning and response.

For example, in the wake of 9/11, best practices have been tightened in the area of freight security. More robust, secure seals are encouraged for use in cargo, such as electronic seals (combining a physical seal with passive or active RFID components) employed as a multilayer approach to security. Active RFID seals, which carry batteries and log events of tampering, are preferred. Sensors can be used to monitor cargo conditions, auditing events and containers in real time. Many older systems have had to be replaced because pre-9/11 concerns were primarily with contraband, not sabotage. Trailers, railcars, and containers can be scanned with nonintrusive inspection technologies like gamma rays and X-rays, and personnel can use portable devices about the size of a smartphone to detect radiological or explosive material.

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See Also: Air Traffic Control; Air Travel; Border Disputes; Earthquakes; Evacuation; Failed States; Hazardous Materials; Hijackings; Human Trafficking; Insurance; Land Mines; Marine Travel; Preparedness; Sabotage; Security; Situational Analysis; Terrorism.

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Transportation Systems, Vulnerability

The movement of people and goods is vital to the economic growth and productivity of a metropolitan region, and this critical activity is threatened when a region's transportation infrastructure is disrupted. The challenge for emergency managers and urban planners is to plan for and limit the disruptive impacts that crises can have on multimodal transportation networks. This article describes the disruptions that urban transportation systems in the United States have faced over the past decade, the impact that such crises have had on each city, and how cities have effectively responded to these challenges.

The Impact of Disruptions on Transportation

Urban transportation systems are vulnerable to disruptions, encompassing the predictable and unpredictable, natural and human-made. Table 1 summarizes recent crises that have generated short-term and long-term disruptions to roads, bridges, subway systems, railroads, and airports in cities where transportation systems experienced severe impacts. With the exception of the two human-made, foreseen "crises," each of these incidents resulted in fatalities; all had a significant impact on the normal flows of people and goods across the metropolitan area. The level of impact that each incident had on the multimodal transportation systems of each of these afflicted regions is summarized in Figure 1.

Because of the unpredictable intensity of extreme weather events, transportation systems are especially vulnerable during natural disasters. Although hurricanes and blizzards can be forecast well in advance, a significant impact on critical infrastructure is often inevitable; the complexity of such storms and the potentially deadly conditions associated with them pose serious challenges for emergency management and transportation agencies. The January 31, 2011, blizzard that struck Chicago may not have caused structural damage to transportation infrastructure, but it did create life-threatening conditions, with hundreds of vehicles and buses stranded on Lake Shore Drive during the height of the storm, highlighting the challenges that cities face in protecting residents' safety even when natural disasters are anticipated.

Hurricane Katrina, a Category 4 hurricane that struck New Orleans and the Biloxi-Gulfport metropolitan area in August 2005, was the most disruptive of the crises listed in Table 2: Highways, railroads, bridges, and airport terminals sustained significant structural damage from coastal flooding and wind gusts, and the port of New Orleans was shut down for weeks. Transportation networks in the Houston, Texas, and New York City metropolitan areas also felt the impact of destructive hurricanes in 2008 (Ike) and 2011 (Irene), respectively, as each of the storms also resulted in major structural damage to bridges and railroads and long-term suspensions in services and road closures. The complexity of hurricanes, which have the potential to generate life-threatening coastal and inland flooding, tornadoes, strong wind gusts, and flying debris, place transportation networks and, more important, human lives at a particularly high level of risk relative to other natural disasters.

Preparing Transportation Systems

When a critical transportation link is unexpectedly suspended or severed, cities with a complex network of secondary roads or less frequently used means of travel are better equipped to adapt to short-term and long-term shocks. For example, some unanticipated disasters may significantly damage or disrupt at least one critical mode of transportation that residents and commuting workers are highly dependent on, forcing travelers to utilize less affected modes. In 1994, some Los Angeles area freeway commuters were able to shift to Metrolink commuter rail after sections of Interstate 5, Interstate 10, and major arterial roads were damaged and in need of major reconstruction following the Northridge earthquake. In the New York area, mass transit services were

Table 1 Recent U.S. crises with short- and long-term disruptions to transportation

	Foreseen	Unforeseen
Natural	2005: Hurricane Katrina (New Orleans) 2011: January 31 blizzard (Chicago)	1994: Northridge earthquake (Los Angeles) 2007: California wildfires (San Diego)
Human-made	2005: Transit strike (New York) 2011: "Carmageddon" (Los Angeles)	2001: September 11 (New York and Washington) 2003: Electrical blackout (New York) 2007: Bridge collapse (Minneapolis)

suspended after the September 11, 2001, terrorist attacks and the 2003 northeast blackout, leading over 150,000 Manhattan commuters to use the region's network of ferries, which did not experience a major disruption from either incident and served as a vital contingency during such crises. Even though disasters in Los Angeles and New York City disrupted the primary means of transportation within the metropolitan area, the multimodality of transportation infrastructure greatly contributed to the resiliency of each city's system following such unforeseen disruptions.

In addition to the natural and human-made disasters already discussed, a third type of crisis has also recently affected transportation systems in the nation's two largest cities. In 2005, a five-day strike by transport workers in New York City resulted in a system-wide shutdown of all subway and bus services operated by Metropolitan Transportation Authority (MTA), forcing the city to employ contingency plans to manage the anticipated congestion, such as restricting traffic entering Manhattan to high-occupancy vehicles (HOV) only. NY Waterway and the Staten Island Ferry played a major role as alternative means of transportation once again, but many New Yorkers, particularly from the city's most populous borough of Brooklyn, chose to walk or bike to work: Pedestrian volumes on the Brooklyn Bridge during the strike were over 20 times higher than average.

In July 2011, a weekend shutdown of a key Los Angeles artery (Interstate 405) because of

Impact of Disasters on Transporation Systems	**Roads (Cars, Trucks, and Buses)**	**Heavy Rail**	**Subway/ Light Rail**	**Air**	**Water**
Northridge Earthquake, Los Angeles (1994)	⚠	◍	○	○	○
September 11, New York and Washington (2001)	⚠	◍	⚠	⚠	○
Northeast Blackout, New York (2003)	◍	◍	◍	◍	○
Hurricane Katrina, New Orleans and Biloxi (2005)	⚠	⚠	N/A	⚠	●
Transit Strike, New York (2005)	◍	◍	●	○	○
I-35W Bridge Collapse, Minneapolis (2007)	⚠	○	○	○	◍
California Wildfires, San Diego (2007)	◍	◍	○	○	○
January 31 Blizzard, Chicago (2011)	⚠	◍	◍	◍	◍
"Carmageddon," Los Angeles (2011)	◍	○	○	○	○
	Roads (Cars, Trucks, and Buses)	**Heavy Rail**	**Subway/ Light Rail**	**Air**	**Water**

⚠ **Severe impact (structural or significant damage and/or life-threatening conditions)**

● **High Impact (minimal or no damage; long-term, system-wide suspensions/closures, that is, more than 24 hours)**

◍ **Moderate Impact (minimal or no damage; short-term with some long-term, isolated suspensions/closures)**

○ **Low/No Impact (minimal or no disruption in services or infrastructure)**

Figure 1 Recent U.S. crises and their level of impact on transportation

Sources: U.S. Deptartment of Transportation, National Transportation Safety Board, New York City Deptartment of Transportation, Associated Press, *New York Times*, *San Diego Union-Tribune*, *Los Angeles Times*, and the *Chicago Tribune*.

Case Study: Identifying Vulnerable Transportation Infrastructure in New York City

New York City's vulnerability to a hurricane became increasingly evident following Hurricane Irene in 2011: Coastal flooding has the potential to create significant disruptions in the city's vast network of streets, bridges, highways, subway stations and tracks, and railroads. Using the National Oceanic and Atmospheric Administration's (NOAA) Sea, Lake, and Overland Surge from Hurricanes (SLOSH) coastal flooding model, emergency managers can identify the most vulnerable transportation infrastructure that will require special attention and preparations in the event of such a disaster.

To identify vulnerable infrastructure, emergency managers and transportation agencies can use publicly available data on storm surge inundation zones based on the SLOSH model from the New York State Office of Emergency Management, simulating the coastal flooding impact of hurricanes of varying intensities on the New York City metropolitan area. Using Geographic Information Systems (GIS) software, vulnerable infrastructure can be identified by overlaying projected storm surge data with the locations of subway stations and streets and using the intersect tool to segregate stations and streets that would be affected by coastal flooding.

Though the probability of a major hurricane (Category 3 or higher) striking New York City remains very low, Hurricane Irene in 2011 demonstrated that there is precedent for a less potent but still potentially disruptive storm. New York City's subway system is particularly vulnerable to disruptions and power failures caused by flooding that have previously led to system-wide shutdowns. Some subway stations in Zone 1 storm surge areas are at risk for coastal flooding in the event of a Category 1 hurricane.

In addition, many streets in the most vulnerable neighborhoods for coastal flooding may also be rendered impassable during a Category 1 hurricane. For example, in southern Brooklyn, corridors such as Avenue X, Neptune Avenue, and Ocean Parkway in Brighton Beach and Sheepshead Bay could become impassable because of street flooding.

Because of the widespread disruption that hurricanes are likely to have on transportation systems, emergency managers are increasingly employing proactive strategies and tools not only to identify vulnerable infrastructure and facilities, but also to assist with evacuation planning and storm preparations. This application of storm surge modeling in identifying the vulnerability of transportation systems in New York City is an example of one tool that can be used to effectively prepare for the potentially devastating impact of hurricanes in coastal cities.

construction prompted local officials, fearing widespread traffic congestion, to warn residents, by using social media and public service announcements, against driving while encouraging the use of alternative means of transportation: Many residents heeded the message, as weekend ridership on the region's MetroLink commuter rail network set records, while the impact on traffic elsewhere in the city was not as significant as anticipated.

These planned, human-made disruptions in each city's transportation system demonstrate the important role of communication in facilitating traffic flow when a vital method of transportation is disrupted. By using social media and smartphone applications as well as traditional means of public outreach, emergency managers and planners can mitigate the impact of such crises on a region's transportation system well in advance by alerting travelers of where and when disruptions occur and what other modes of transportation can be utilized contingently.

Disasters have the potential to affect all modes of transportation. Cities have also taken measures to identify the most vulnerable infrastructure and facilities to determine where to invest in storm preparations, enhance resiliency of infrastructure to potential disasters, allocate resources to assist in evacuation planning, and declare closures of roads, bridges, tunnels, and transit stations to protect the safety of residents and travelers. Given the destructive impact of hurricanes such as Katrina, Andrew, and Ike, state, local, and regional agencies in vulnerable coastal cities have published resource guides for transportation and emergency management that overlie storm surge risk data using geographic information systems (GIS) software with the locations of streets, highways, bridges, and hospitals to identify the most at-risk areas in the event of a hurricane. These proactive measures can be effective in preparing for the devastating impact that such disasters can have on a region's vulnerable transportation systems.

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See Also: Air Travel; Evacuation; Hurricanes, Typhoons, and Cyclones; Marine Shipping; Marine Travel; Terrorism; Tornadoes and Severe Thunderstorms; Transportation Security.

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Trauma

Crises occur quickly and unexpectedly. They comprise of components of threat and surprise, which produce stress and thereby cause subsequent distressing reactions in survivors. Crises are also marked by high levels of potential danger (such as loss of life) and fast actions by public officials to counteract any potential threat that may arise from the crisis. These potential dangers are unanticipated events that throw off the everyday patterns of life. The very nature of crises produces conditions that may lead to physical and/or psychological trauma. Conceptually, trauma is any psychological or physical injury that requires immediate or long-term professional help. Consequently, many individuals who encounter a crisis must seek professional treatment from trained crisis management counselors who have the ability and talent to work effectively with people who have experienced trauma as a result of a crisis.

For individuals affected by a crisis, the events produce a flood of emotions that may cause direct physical harm. Oftentimes, in the aftermath of a crisis, individuals find themselves in a situation that is completely unanticipated and beyond their previous experiences. If such emotional responses are not experienced and managed appropriately, ineffective coping mechanisms may occur, which then manifest themselves in negative long-term consequences that include post-traumatic stress disorder (PTSD) involving depression. The condition of depression may inhibit personal recovery. There are more favorable ways to cope with the uncertainty surrounding disaster situations and crisis that involve acceptance and lead to rebuilding. Therefore, how people cope psychologically immediately following a catastrophic event can influence how well they recover from the event.

When an individual experiences a traumatic situation, he or she may react with both physical and psychological symptoms. Common physical symptoms are continued headaches, dizziness, fatigue or general loss of energy, elevated blood pressure, and pain in the stomach, chest, joints, and muscles. Victims of crisis often attribute experienced physical symptoms to exposure to toxic substances, such as seen after the September 11 terrorist attacks, or to medications administered to them during crisis recovery.

The result of these physical problems can lead to social unrest and amplification of the health problems or a rise in psychological problems. Often, such post-crisis physical issues are described as medically unexplained physical symptoms (MUPS). Responses to traumatic symptoms can be positive or negative and can be minor, such as pacing, topic avoidance, and temporary withdrawal, or severe, such as substance abuse, violence, or suicide.

In order to recover from a traumatic event, several coping mechanisms can be used by those involved. Coping is simply a reaction to a traumatic stressor (such as a crisis) that requires mobilization and excludes automatized behaviors and thoughts, which do not require effort. It refers to the thoughts and behaviors people use to manage the demands of stressful transactions. Certain personality characteristics such as self-esteem, optimism, and perceived self-control have been proven to be valuable coping resources of trauma reduction.

Unfortunately, some crisis events are so severe they cause victims to relocate. Research findings support the belief that relocation can be a factor in coping with the stress of a crisis. For example, children relocated after a cyclone in Australia experienced academic difficulties. In comparison, in two communities requiring massive relocation, one resulting from a tornado and one from a flood, individuals experienced post-traumatic stress disorder. Although PTSD was found to diminish over time, the initial required relocation because of the crisis created high levels of PTSD. Research suggests that one mediating variable that appears to influence how well individuals adjust to stressful situations is the type of coping strategies they utilize. Several strategies exist to help reduce the post-crisis trauma.

Case Study: I-35W Bridge Collapse

On August 1, 2007, at 6:05 P.M., an almost-2,000-foot section of a bridge on I-35W fell into the Mississippi River and onto roadways below in Minneapolis, Minnesota. The collapse killed 13 and injured 145 others. This north-south bridge connected the Minneapolis neighborhoods of Downtown East and Marcy-Holmes. Despite being under renovation, the bridge was packed with rush-hour traffic. With an estimated 100 vehicles on the bridge, the concrete and steel bridge buckled suddenly under the weight of heavy traffic. The high levels of traffic at the time of the collapse resulted in dozens of vehicles falling with the bridge and nearby individuals scrambling for safety. This type of crisis can be classified as a technical-error accident, or a breakdown in infrastructure. Such crises can cause both physical and psychological harm. The media spectacle of the bridge collapse was replayed on television news throughout the evening across the country and for days locally in Minnesota, along with the video of a school bus filled with children that had slid down the embankment as the bridge failed.

Over the course of five days following the bridge collapse, 166 questionnaires were collected from Minneapolis residents. The study examined the coping strategies of individuals and the subsequent results of those strategies. The goal of the study was to examine how people cope in the aftermath of an infrastructure breakdown and to use those results to aid recovery workers and inform emergency practitioners on how to prepare to meet the needs of the general population in such an event. The self-report questionnaire was used to address the emotional state and coping behaviors of local residents. The study found that emotional distress in the period immediately after the collapse was related to the endorsement of a number of coping strategies. Specifically, women reported experiencing higher levels of psychological distress than men and endorsed thinking and seeking information about the event more than men. Regardless of gender, thinking about the crisis was associated with a decrease in feelings of fright between the initial period after the crisis and several days after the event.

Information Seeking

After a crisis, individuals experience high levels of uncertainty. In a time of crisis, uncertainty can motivate individuals to engage in information seeking. People seek information from the sources immediately available and attempt to update their knowledge and understanding of the crisis. Research in social psychology posits that individuals are fundamentally motivated to seek resolution, certainty, and the return of predictability to their surroundings. The need to seek information for the purpose of reducing uncertainty is especially strong during a crisis when the potential outcomes may be extremely harmful and, for the most part, uncontrollable. Obtaining information facilitates further remedial processes. Lack of information may produce high levels of uncertainty, a feeling of loss of control, and associated stress The simple act of obtaining information can allow individuals to view the way others behave during the event, allowing them to know that others are experiencing the tragedy with them. This assures people that they are not going through the tragedy alone.

Faith

The beneficial role of perceived spiritual support that one that derives from using faith to cope in a variety of circumstances is well documented. Although faith serves a world-maintaining function in everyday life, it is particularly helpful in providing answers when everyday understandings of reality are called into question by crisis events. After the September 11 terrorist attacks, it was found that individuals with varied backgrounds turned to prayer to cope. Often, when events are uncontrollable or not easily accepted or understood, people turn to belief in some kind of higher power for support. In times of crisis, people view faith as a comforting and controlling mechanism they can use to manage the situation. This may also be correlated with the notion of a locus of control. The positive role of faith is so well known that government and nonprofit emergency response agencies often partner with faith-based institutions in order to ensure the faith needs of crisis victims are met immediately after an extreme event.

Self-Efficacy

An individual's ability to take action during the crisis brings about a sense of empowerment, thus creating a feeling that the individual has some control in the situation. Simple acts such as boiling water have been shown to help individuals reduce psychological stress in the aftermath of a crisis, even when the promoted act is not likely to reduce susceptibility to a risk. Further, different emotions are characteristic of different action tendencies. This also may be related to locus of control. For example, individuals who possess a sense of control or mastery over life (an internal locus-of-control orientation) are more likely to engage in action. Two types of efficacy are important in coping after a crisis: they are self-efficacy and response efficacy. Response efficacy is a person's belief that the coping measure will work and be helpful; self-efficacy is the person's belief that he or she has the ability to complete the suggested response. The belief that suggested actions will work, and that the person may engage in those actions, allows individuals to begin to overcome issues of psychological and physical trauma.

Communication

Communication research has indicated that during a crisis, individuals are likely to engage in increased interpersonal communication interactions in order to further alleviate negative affective experiences. Research on responses to 9/11 provided strong support for the importance of interpersonal communication in the information exchanges used for coping. A substantive body of research in the communication and psychology literature has lent support to the notion that interpersonal exchanges are critical in the coping process of crisis response. Simply the act of talking to others can reduce psychological stress, or asking others for specific help with physical problems can lead to a sense of recovery.

Gender Differences

Differences in gender may also have an influence on coping strategies. Women and men apply different mechanisms of stress reduction when performing the same activity. Men have been found to use strategies involving increased self-control, which involve the inhibition of displays of personal feelings, whereas women used increased positive reappraisals. Men more often report controlling their emotions, accepting the problem, avoiding rumination, and engaging in problem-solving efforts. In particular, research on crisis response suggests that women may be more inclined toward information seeking in times of crisis. There is also evidence to support that women find the events of displacement after a crisis more traumatic, while demonstrating greater flexibility in their ability to adapt to new locations and appraise survival strategies. A greater inclination by women to seek social support, engage in activities as a distraction, and turn to prayer is preeminently consistent across studies.

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See Also: Agency Notification and Mobilization; Coping Capacity and Response Capability; Decision Making Under Stress; Evacuation; Journaling; Mass Media; Post-Traumatic Stress Disorder; Preparedness; Refugees and Forced Migration; Resiliency; Vulnerable Populations.

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Triage

When faced with a large number of casualties and limited medical resources, it is necessary to determine the priority of patients' treatments based on the severity of their condition.

This process is called triage, and it is appropriate in cases of disaster when most medical systems cannot always supply options in order to cope with the emergencies. Medical triage in disaster situations is a process that determines the order of priority medical treatment and evacuation in such a way as to achieve a perfect use of facilities, ensuring the best chances of survival to a large number of casualties.

History

Triage—medical triage in disaster situations—is the process of deciding how seriously ill/sick or injured a person is, so that the most serious cases can be treated first. The term comes from the French verb *trier*, imposed by Dominique Jean, Baron Larrey (1766–1842), a military surgeon under Napoleon (who also described in his work things such as the type of hip amputations needed in situations of war, the condition known as trench foot, and the term *stretcher-bearer*).

British surgeon John Wilson proposed in 1846 using different types of treatments to be consistent with the chance of survival, thus inspiring categories of treatments on levels of triage. Military medicine over the years had a significant impact on the development of medical triage. The difference in doctrine between the two types, civil and military triage, lies in the strategies of the two entities, the war, and the need to have fighters in a very short time with the aim of assisting as many victims as possible.

Definition and Methods

Triage is a formal system used to identify, classify. and treat victims according to their severity of suffering. Under the guidance and goal of disaster medicine, it offers a chance to be saved to as many people as possible.

Triage is a true race against time, operating under the utilitarian rule that governs emergency and disaster medicine: the greatest good for the greatest number of people. This rule is justified only in clear need of the public good in crisis situations. Triage consists of the following elements:

- Rapid assessment of victims
- Assessing the severity of injuries and their consequences on the victim's vital functions
- Categorization of victims
- Resuscitation, stabilization, and safe conditions of transport
- Targeting the correct evacuation of victims
- Creating a dynamic, continuous, and progressive process

Medical examinations should be simple maneuvers with the following criteria:

- As soon as possible, to not delay treatment and disposal
- Accurate, safe, and reliable
- Meticulous; even if the clothing is not removed, the examination will be a complete process

One of the most commonly used methods is to examine using the MASS algorithm, as follows:

- Move: search and rescue
- Assess: assess and analyze
- Sort: decide triage category
- Send: evacuate, decide where

Targeting the correct evacuation of victims, implementing a medical intervention that determines the order of treatment and evacuation priorities in such a way as to achieve a perfect use of existing facilities, will provide the greatest chances of survival for the greatest number of victims, thus accomplishing the goal of disaster medicine.

In developing processes for the emergency system, it became necessary to impose a way of ranking the different emergencies. Establishing such a ranking system had been considered by many different medical professionals. Considerations were primarily medical, seeking to achieve better and more effective health care. With the development of emergency medical facilities and the introduction of ambulance services that offer facilities comparable to a hospital, not to mention air medical transport (ambulance helicopters and planes), the economic aspect became a prevailing factor. Using more precise codes to provide a streamlined approach in the emergency action, on one hand, and supplying the most comprehensive information, on the other, would soon prove to be a necessity.

Triage is used to determine the priority of treatment, taking into account the resources available at the time and the type of event, which may range from accidents with a number of victims exceeding the capacity of the existing medical resources to accidents or attacks of biological, chemical, or nuclear nature. The underlying principles of triage are universal, the difference in methodologies being strictly responses to the different types of events and the available resources.

In disaster medicine, the priority is the population taken as a whole and not the individual, therefore choosing the best option for the greatest number of people. These triage categories are valid for international use, providing an efficient algorithm, increasing the chances of survival of a significantly higher number of victims than concentrating all resources on single individuals who are the most severely injured.

The differences in the triage algorithm depend on the existing situation. In the case of an accident/attack of biological, chemical, or nuclear nature, the usual victim categorization (including children) is overridden by the overall condition of those involved.

Although it is a difficult task regardless of the nature of the event, triage is a task to be undertaken responsibly, without emotional involvement, and making good use of all available knowledge, thereby increasing the survival chances of the highest possible number of individuals.

Deciding which victims can wait, which require immediate evacuation, and which have no chance of survival, regardless of resuscitation means, is a decision to be made at the disaster site.

Such decisions are based on the result expected after applying first aid and not on the severity of the victims' injuries; in other words, this process is completely opposite to the day-to-day procedure that requires medical aid to be granted to all patients, whatever their chances and prognoses.

Triage is a continuous process performed at the disaster site (first level), a second-level triage being performed upon leaving the site, and a third-level triage carried out at the hospital, where the injured are transferred between different hospital departments. At the hospital, in the operating room, a fourth-level triage is performed.

Primary disaster triage is based on physiopathology: (1) how well and for how long will the victim continue to use all of his or her own resources to maintain homeostasis and (2) which victims will benefit most from the resources available at the time.

Secondary triage is a means of measuring the strength of the victim and anticipating the victim's needs. It includes the following:

- Reviewing physiopathology
- Re-evaluating the victims' physical suffering
- Initial treatment and monitoring patient response to treatment
- Perfect awareness of available resources and of those who are to come

Secondary triage has the aim to identify the following categories of patients:

- Victims who need supportive treatment for their vital functions that can be delivered only in the hospital
- Victims who need supportive treatment for their vital functions that can be delivered at the scene of the disaster site
- Victims whose injuries do not involve vital functions, but who are at risk of complications
- Victims with minor injuries

The purpose of tertiary triage is to optimize individual results for with each victim. It includes (1) reassessing the patient, monitoring and delivering advance treatments; (2) subsequent reevaluation of health care resources; and (3) determining the best solution for definitive treatment.

The purpose of quaternary triage is not to restrict and/or avoid risk increase in the form of active and professional monitoring. This is performed in the preoperative area, by an anesthesiologist or/and intensive-care professional, based on his or her higher degree of freedom of action and specialist knowledge. This triage stage can change the priority ranking of a victim and should prevent the occurrence of unexpected complications.

Triage: Key Points

The lack of adequate resources, the high number of victims, and unexpected aspects are limiting factors in triage. The unexpected aspects refer to the disruption of daily life patterns and the necessity of adapting existing means to unusual situations and methods. Triage should be dynamic, continuous, progressive, and adaptable to changes both in the needs of victims and the need/use of resources.

Triage at the Disaster Site

At the disaster site, there should be a doctor together with a medical team who should examine all the victims and perform triage. The first aid team will be involved in setting out the documents that will accompany victims during transport to ensure communication with the hospitals receiving the casualties.

The first task of the doctor arriving at the scene is to determine the extent of the disaster, possibly with the help of witnesses. He or she must manage communication and cooperation with the ambulance services, the hospitals receiving casualties, the civilian authorities, the Red Cross, the army, and any other organization that can provide emergency aid (such as the civil society). Subsequently, the first aid team must identify victims who need medical help and direct them to a treatment center. Treatment at the scene of the disaster will be limited to measures aimed at maintaining basic life functions. If the number of victims exceeds the capacity of intervention of the first aid team, the medic in charge of triage will call on a mobile medical unit. If casualties are extremely high and resources are insufficient, the medic at the scene will be faced with an unusual but indispensable procedure, that is, deciding which of the victims have a chance of survival if treated and separating the ones without any hope of survival. All deceased individuals will be subject to a post-disaster forensic examination and a medical certificate will be issued at that stage so as to avoid the first medical response unit having to deal with such matters.

Triage Methodology

In all possible cases, all victims should be identified at the time of triage. One of the most used methods, inspired by the Laerdal Group work, uses customized labels with different colors for the victims, depending on the seriousness of injuries and evacuation priority.

Red label: The red label corresponds to the highest priority of evacuation and is reserved for victims who need immediate help for the following reasons:

- Respiratory problems that cannot be solved on the spot
- Confirmed cardiac arrest
- Serious bleeding and blood loss over 1 liter
- Unconsciousness
- Thoracic perforations or severe abdominal injuries
- Severe fractures of pelvis, thorax, or cervical vertebrae, and fractures or dislocation that impedes the pulse
- Serious commotions
- Burns followed by complications with the respiratory tract

Yellow label: The yellow label determines second-priority evacuation and involves victims who need medical help but whose life is not in immediate danger for the following reasons:

- Second-degree burns on more than 30 percent of the body
- Third-degree burns on 10 percent of the body

A wounded Haitian man arrives at a medical triage processing center in Port-au-Prince, Haiti, via a U.S. Navy Sea Hawk helicopter during Operation Unified Response, January 23, 2010. During the response to the January 12 earthquake, medical access points across the city were staffed by various agencies. With limited resources and an overwhelming need, medical teams were forced to make life-or-death decisions for critical patients every day, many of whom had conditions and illnesses not related to the earthquake.

- Third-degree burns in critical places such as hands, feet, and face, but without respiratory complications
- Burns complicated by severe soft tissue injuries or minor fractures
- Moderate bleeding (from 500 to 1000 ml)
- Lesions with or without touching the dorsal spine
- Victims with cerebral skull lesions (severe enough to cause a subdural hematoma or confusion) characterized by leakage of cerebrospinal fluid through the nose or ears, epistaxis, or otoragie; rapid increase in systolic blood pressure; vomiting in jet; changes in respiratory rate; bradycardia in 60/minute, swelling or suborbital hematoma; anizocorie pupil; collapse; or zero or low motor response or reactions at low sensory stimulus (profound stupor)

Green label: The green label marks third-priority evacuation and involves victims whose injuries are minor and who do not require special care for the following reasons:

- Fractures of fingers or teeth
- Excoriation or bruises
- Minor burns
- Degree burns up to 15 percent of the body
- Third-degree burns on about 2 percent of the body
- Degree burns covering more than 20 percent of the body except the hands, feet, and face.

Black label: The black label is reserved for deaths or fatal injuries and those without hope. Dead victims are defined as those who are not breathing and have no pulse for at least 20 minutes and whose condition does not allow for continuing resuscitation techniques. This label is also applied to the following categories of victims without hope:

- Second- and third-degree burns covering more than 40 percent of the body regarded as hopelessly fatal
- Second- and third-degree burns covering more than 40 percent of the body accompanied by major injuries such as important fractures, major cerebral skull lesions, chest injuries, or head injury involving uncovered brain tissue and accompanied by unconsciousness
- Skull injuries accompanied by major fractures
- Brain or spinal cord injury with no sensation and motility
- Serious injury victims over 60 years of age

Blue label: In recent times, the modernization of emergency medicine and intensive care as well as logistics has meant that triage has become more accommodating in the sense of not condemning a category of victims to certain death, which can sometimes be very difficult to accept. As a natural consequence of such developments, a new color label was created: the blue label.

The blue label is for victims who would, in normal circumstances, be categorized with a black label but because of additional resources becoming unexpectedly available, have a chance to survive. Given that the difference between the victims marked with red labels and those marked with black labels is very small, in such circumstances where the extent of the disaster is lesser and the intervention forces are sufficient, blue-label victims will also be evacuated. Therefore, the last remaining ones to be evacuated will be those who have absolutely no chance or the deceased.

START-type triage also uses five categories of victims. It uses means of investigation that are basic and convenient, such as the following:

- *Presence of breath:* simple observation and counting of respiratory frequency-threshold value-30/minute
- *Reperfusion speed:* using capillary refill test: normal time > 2 seconds
- *Mental quality by examining the mental status of the victim:* the AVPU scale (Alert, Voice, Pain, Unresponsive): the victim is alert, responds to verbal stimuli, responds only to painful stimuli, or no answer.

The SMART type triage involves the following five steps:

- *Step 1:* The medic in charge or the individual in charge should ask all individuals who can move to go to a predesignated area, where possibly a secondary triage would be under way. All such ambulatory patients are initially designated in the green category.

- *Step 2:* Victims are consulted and/or observed as they are brought/found, observing the presence or absence of spontaneous breath. If breathing, go to Step 3. If the victim has apnea, he/she is placed in the safety side position and the upper airway opened by lifting the jaw/triple maneuver. If the victim is still in apnea after 1 minute, he/she should be given the black label. If the victim starts to breathe spontaneously, he/she should be given the red label.
- *Step 3:* Observe respiratory rate. If the rate is 30 or higher, proceed to step 4. If it is less than 30, the victim is designated with a red label.
- *Step 4:* Observe capillary refilling time. If the refill time is 2 or less, proceed to step 5. If the refill time is less than 2, the victim is designated with a red label.
- *Step 5:* Observe mental status by giving simple commands .If the victim is capable of performing such commands, he/she should be labeled yellow. If that is not the case, the label will be red.

Severity Factor

Categorized by severity factor, emergencies can be classified in the following categories:

- *T1:* victims requiring immediate life support, which is sometimes called the "golden hour"; this category of victims requires immediate hospitalization.
- *T2:* victims requiring medical attention in a maximum of 4 to 6 hours (also called the Friedrich period).
- *T3:* victims showing stable vital signs but who have injuries that require medical attention. This category does not require hospitalization, but their monitoring is extremely important, as such victims can develop conditions that have not been previously diagnosed, require that such victim's transition from one category to another. This may be because of an increased level of severity of distress/suffering.
- *T4:* victims with unstable vital signs and who have decreased chances of being saved under disaster conditions. However, as usually it is very difficult to characterize a victim as without a chance, recent triage methods have qualified this triage categorization, referring to the blue-label category under which such victims can get help if local conditions and resources allow.

This classification is justified for obtaining maximum effectiveness, as it is reasonable to provide maximum resources so lives can be saved and to differentiate the victims without a hope from those already deceased. Chemical and nuclear accidents and incidents require a change in triage methodology imposed by the specific aggression. In the case of nuclear accidents there is the necessity of physical decontamination; this separates the victims based on those irradiated and those not irradiated. Chemical accidents, impose the problem of neutralizing the agent. Both raise the issue of removing victims from the active outbreaks, so triage is performed in ad hoc structures.

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See Also: Emergency Medical Care; Emergency Medicine; Emergency Responders; Health and Medical Response Scenarios; Hospital Emergency Room; Mass Care; Surge Capacity, Hospitals.

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Trigger Events

To understand what a "trigger event" is, one must first define it. A trigger event is "any event that sets a course of action in motion or an event that precipitates other events." Using this definition, trigger events can relate to just about anything that has potential to harm a corporation, a community, or the public at large.

A trigger event can necessitate that a series of activities be implemented over time and—depending on the situation—can also create other responses. For example, the activation of a contingency plan because of a system outage can have financial implications: fines might be implemented if the system isn't restored in a timely manner. So the trigger event for the system outage can be the cut of a power line by a neighboring construction company, but the trigger event for financial fines being applied is the inability to restore and recover the systems impacted. Trigger events are what cause crisis management teams to implement contingency strategies based on an appropriate response to the situation at hand.

Trigger events can be internal or external and can be created through human-made activities or natural/environmental conditions.

Internal triggers originate from within a corporation or community; examples include such events as a failed system change request (SCR) not being fully vetted for impacts or a worker mishap because the worker didn't follow the rules for a specific procedure.

External triggers originate externally to the corporation and community that neither has control over and that did not originate with them. These would be such things as earthquakes, floods, hurricanes, tornadoes, and tsunamis, to name but a few.

The threat of a potential trigger event should initiate the implementation of activities that help mitigate the threat and/or the impact of the potential crisis. A crisis management team (CMT) may implement safety measures for an impending tornado warning by alerting the community to be watchful and prepared in the event the tornado occurs. Though it has not occurred yet, the tornado has already triggered specific activities.

They are two kinds of trigger events: immediate and delayed. The threat of a flood can trigger precautionary measures to be implemented and thus, it is an immediate event. Fires, floods, and earthquakes don't come with much warning and thus are immediate trigger events. When they occur, there is an immediate need to implement a response strategy because a delay can cause loss of life and property. There is no discussion about what to do, but rather trained personnel respond into action at the outset of the disaster.

However, some trigger events aren't seen at all because they happen with no one—or very few—even knowing that they occurred. For example, an information technology (IT) change may have been made and only known by the individual making the change; from their perspective, no impact is found. It is not a trigger event in this case. However, days later, another individual tries to generate a specific report but is unable to do so because the IT change didn't implement as expected. Now the IT change has become a trigger event, as investigation and resolution activities begin, as well as those that have to be performed by the group(s) awaiting the report to continue their own operations. Some may not even be known for some time; using the previous example, a report that is generated each month may be corrupted by the change. But the change was done weeks earlier and thus not noticed until such time. Now, at the end of the reporting period, when systems are intended to provide information, it cannot be done because the trigger event that occurred actually happened much earlier than when it was identified. To mitigate this so that a crisis does not occur, sufficient change management processes should be in place.

Sometimes there are early warnings for pending crises or disasters. For example, news reports provide information on coming storms and strikes that could affect corporations and require them to activate some level of crisis management; storms will keep people away, productivity could go down if there is no work-at-home plan, or deliverables for projects could be impacted. Some are instantaneous in nature, such as explosion/fire, and immediate responses and actions are required. Some are slow in nature to evolve into a crisis, which can mean a delayed response or an untimely response.

A trigger event can be immediate or slow moving, which means over time the small event escalates into something more substantial. The crisis management team needs to know how and when to escalate to manage the situation. There must be links to any incident-management approach so that while the situation is small, as it escalates, the CMT or "disaster" team gets involved.

For crisis management, trigger events—both real and perceived—cause varying levels of repercussive activities to be initiated, with the intent of reducing the impacts upon people, facilities, and technology infrastructure.

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See Also: Crisis, Definition of; Risk Analysis; Risk Assessment.

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Tsunamis

Over the last 10 years, a number of tsunamis have had a major impact not only upon the people directly affected but also upon millions of people around the world who watched the events unfolding on their television screens. These include the Indian Ocean tsunami of December 2004, the little-reported tsunami in Chile in 2010, and the Japan tsunami in 2011, with both its primary effect of the flooding and the secondary effects on two nuclear power stations. From a crisis management point of view, how should we plan to deal with this type of event?

First, it is important to learn lessons from these events and to ascertain what worked well in emergency response plans and what went wrong and why, then to look at current plans to see what changes should be made, remembering to keep some degree of flexibility within the plan to ensure it is adaptable. By their very nature, tsunamis can affect areas thousands of miles from the earthquake or landslide that triggered the event.

Early warning sites are on the Internet that have an automated notification system for low-lying coastal areas at risk from tsunamis. The Pacific Tsunami Warning Center and RSOE EDIS (Hungarian National Association of Radio Disaster-Signalling and Infocommunications Emergency and Disaster Information Service) emergency alert maps are free, have very useful information, and are continually updated to provide the latest information and should be an integral part of planning.

The major difference when dealing with the effects of a tsunami and an earthquake is not only the loss of infrastructure but also the loss of normal landmarks after a tsunami. Even after an earthquake during which buildings have fallen into the streets, the local emergency personnel still know where they are, whereas after some tsunamis, so few buildings remain standing it becomes far harder for emergency personnel to orient themselves, even on streets they may have known for years. Also, unlike an earthquake, where local emergency services can start the recovery process as soon as the quake has passed, after a tsunami there will be (as seen after the Japan tsunami) water that comes ashore and inland for a long period of time, making large populated areas impossible to reach until after the water has subsided. Only then will it be possible to move rescue services into the affected area.

It must remembered that there will be a loss of emergency equipment within the affected area; any emergency vehicle that was not destroyed in the tsunami will have suffered water damage in both its fuel and electrical systems and will be unusable in the first few hours after the event. There will also be a loss of power systems, and it will be necessary to bring in mobile generators both for lighting, depending on the time of the event, and to provide power to local emergency operations and casualty clearing centers.

Search and Rescue

It should be remembered after an earthquake that is not accompanied by a tsunami that there will be collapsed buildings within which there will be areas where victims may be trapped; there have been many accounts of victims staying alive for many days after an earthquake. However, in areas were a tsunami has come ashore, these voids will be filled with water and the loss of life will be high, depending on whether it is a village, town, or city. Some rescue teams found in the Japanese earthquake that not even relatives of those trapped were left at the scene after the tsunami. It is human nature for relatives of those missing to search and help the rescue effort in the hope of finding their loved ones.

In Japan, it was noticeable that this did not happen on the scale that would otherwise be expected—the reason for this was that the relatives of those buried were themselves missing. In such an environment, the focus of rescue moves into recovery faster than anyone would like. The reality of this type of crisis management is that the damage done to properties and lives is extreme. As can be seen in the many videos of the aftermath of both the Japanese and the Indian Ocean tsunamis, which illustrate the effects on the local communities, most of the impacted communities were wiped away. A tsunami isn't one big wave but can be many small waves that come ashore, each one reinforcing the effect of the last, destroying everything in its path., and once the water finally starts to recede, it takes hundreds of tons of debris with it, including the remains of victims, who may never be recovered.

In short, the best way to handle this type of incident is to remember that after the event, there will be limited resources of personnel, equipment, and food. This is true in any crisis, but unlike most other types of events, water contamination will affect most if not everything in the affected area. Needed resources will have to be moved into the area, and some form of logistics expertise is invaluable as the incident develops. It must be remembered that many of the roads and bridges will have been destroyed or will need repair before those routes can be used. The major goal in recovery is the saving of lives, after which it is dealing with the recovery of the dead. There are two reasons for this: first, it helps those who have survived to move on and come to terms with the loss of a loved one, and second, the proper disposal of the dead will help prevent disease, which in the long run can lead to more deaths than the event in the first place.

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See Also: Early Warning Systems; Earthquakes; Emergency Public Information; Evacuation; Multiple Disaster Problem; Search and Rescue.

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Tuberculosis

Tubercle bacillus (commonly called tuberculosis or just TB) is an infectious disease caused by the microorganism *Mycobacterium tuberculosis*. TB is a potentially serious disease that primarily affects the lungs but can also affect the brain, kidneys, liver, heart, and bones. Globally, TB is a major cause of morbidity and mortality, affecting around 1.7 billion worldwide. Annually, there are 8–10 million new TB infections and 1.5 million deaths.

Origins

TB is an ancient disease dating back to at least 4500 B.C.E. based on skeletal evidence from Neolithic Germany. The spines of Egyptian mummies indicated TB infection dating back to 3000 B.C.E. Through the centuries, many have speculated on the causes of TB. The first medical report of TB is credited to Hippocrates (460–370 B.C.E.), who called it *phthisis* (Greek for "consumption"). In 1882, German physician Robert Koch discovered the bacteria responsible for most types of tuberculosis (*Mycobacterium tuberculosis*). In 1905, Koch won the Nobel Prize for this discovery. Koch assumed bovine and human TB were different, but scientists later proved otherwise, and milk has since been pasteurized to remove one of the key infection routes by which humans acquired TB.

Classification

The Centers for Disease Control and Prevention (CDC) classifies *Mycobacterium tuberculosis* at biosafety level three. It is considered a serious or potentially deadly disease after inhalation and requires specific safety equipment and procedures when handling the infectious agent. TB is listed as ICD-9 010-018. The eight listed ICD-9 are 010 (primary TB infection), 011 (pulmonary TB), 012 (other respiratory TB), 013 (TB of meninges and CNS), 014 (TB of intestines, peritoneum, and mesenteric glands), 015 (TB of bones and joints), 016 (TB of genitourinary system), 017 (TB of other organs), and 018 (military TB).

The TB bacterium is *Mycobacterium* genus belonging to the family Mycobacteriaceae and consists of lots of species, with some being pathogenic to humans. The mycobacteria are small rod-shaped species of bacillus, which are classified into three groups for diagnosis/treatment purposes. The first group is mycobacterium tuberculosis complex (MTBC), which can cause tuberculosis in humans and animals, such as *M. tuberculosis*, *M. bovis*, *M. microti, M. africanum* (an opportunistic infection in HIV+ patients), *M. canettii* (rare), and *M. caprae* (rare). The second is *M. leprae*, which causes leprosy. The third group is nontuberculous mycobacteria (NTM), which do not cause TB or leprosy but can cause pulmonary disease that resembles TB and causes inflammation of lymph nodes (lymphadenitis), skin disease, or disseminated disease. Another *M.* genus is *Mycobacterium avium*, which causes a TB-like disease common among AIDS patients, and the paratuberculosis species causes Crohn's disease.

Transmission

Active and untreated TB of the lungs is contagious and can spread to others by the uninfected inhaling the species of bacillus through the aerosolization (i.e., the person speaks, coughs, sneezes, laughs) of tiny droplets from an infected person. TB can remain in the air for several hours. Even though TB is contagious, it is not easy to acquire because it is dependent on duration of exposure, ventilation, frequency of aerosolizations, and pathogenicity of the strain. It is difficult to acquire TB from casual interactions, such as sharing drinking glasses or conversations. Commonly, TB infection requires regular and prolonged close contact with a contagious person before becoming infected, such as from a coworker or living or residing in the same place.

Incubation and Latent/Active TB

After exposure, the incubation period is about six or seven weeks (ranging from two to 12 weeks) before testing positive on a skin test. TB can remain latent (dormant) for months, years, or even decades or convert to an active TB at any time. The risk of latent TB becoming active TB is highest in the first two years after infection and is dependent on individual risk factors, such as being a child, being elderly, and having a compromised immune system.

Latent TB (also called TB infection or inactive TB) is when a person harbors the *M. tuberculosis* in an inactive state; he or she is asymptomatic and noncontagious. This person does not have TB disease, only a TB infection. The slow-growing bacteria are kept under control by the person's immune system producing macrophages that surround the TB. After incubation, a person with a TB infection will have a positive reaction to a tuberculin skin test or blood test. The majority of people (over 85 percent) infected with *M. tuberculosis* never develop active TB. Latent TB to active TB can occur after a few weeks or several years, depending on risk factors and the person's general health. Reactivation of TB typically concedes with a weakened immune system. Active TB (also called TB disease) is when the person is ill, displays common symptoms, and

A USAID TB Survey Program team member documents the prevalence of tuberculosis in Pakistan. The program, which ran from July 2009 through September 2012, is the largest national tuberculosis survey ever conducted in Pakistan.

is contagious. A chest X-ray is usually normal for a TB infection but abnormal for TB disease.

Although anyone can acquire tuberculosis, certain risk factors increase the chance for infection, such as having a weakened immune system; being malnourished, elderly, or a long-term substance abuser (i.e., IV drug and alcohol); or having prolonged contact with institutionalized people by residing or working in a prison, health facility, nursing home, dormitory, refugee camp, or shelter. Weakened immune system groups include those with preexisting disease that includes HIV/AIDS, diabetes, or end-stage kidney disease, as well as those undergoing chemotherapy.

Because of a weakened immune system, HIV+ people are 400 times more likely to acquire TB than the general population, and the progression of latent TB to active TB occurs more rapidly. TB is a leading cause of death in HIV-positive people. People taking immunosuppressive medications for ulcerative colitis, Crohn's disease, or multiple sclerosis, or to prevent rejection of a transplanted organ, are susceptible to TB. Another risk factor is traveling to countries with high TB rates (e.g., sub-Saharan Africa, India, China, Mexico, or Micronesia).

Symptoms

Common symptoms include cough, fatigue, fever, night sweats, weight loss, and loss of appetite. Pulmonary TB symptoms are gradual, ranging from a week to months in duration and include a persistent cough (≥ three weeks) accompanied by thick mucus, coughing up blood (hemoptysis), shortness of breath, and chest pain. Symptoms of extra-pulmonary TB (TB outside the lungs) vary by the body part infected. For example, TB of the spine would include back pain or swollen lymph nodes, while TB in the kidneys could result in hematuria (blood in the urine).

Diagnosis and Treatment

At the most basic level, TB can be diagnosed based on the common symptoms. TB also is diagnosed by a skin test (e.g., injection of a purified protein [tuberculin] under the skin of the arm to see if a reaction/swelling occurs after 48–72 hours). Some groups have false-negative results to the skin test, such as children, the elderly, and HIV-positive people. Other diagnostic tests include chest X-rays for lung abnormalities (only in active TB), culture of sputum (coughed up material), or a polymerase chain reaction (PCR) that detects the presence of the bacteria.

An active or inactive TB is treated with antibiotics. Successful treatment will eradicate the TB bacteria; however, skin tests for TB will be positive for life. TB affecting the lungs is generally treated with a cycle of antibiotics, which for latent TB is generally isoniazid (INH), whereas active TB is treated with INH in conjunction with one or more other medications, such as streptomycin, rifampin, ethambutol, or pyrazinamide. There are drug-resistant TB strains that can still be treated with up to two years of chemotherapy in combination the second-line anti-TB drugs. If left untreated, active TB can be lethal or result in the infection spreading to other body parts via the bloodstream, such as the bones (spinal pain, rib and joint destruction), inflammation of the brain (meningitis), liver or kidney failure (inability to detox blood), and heart (pericardial tamponade). These conditions require extensive medical treatment.

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See Also: Centers for Disease Control and Prevention (CDC); Epidemics; Public Health Surveillance.

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U

Uncertainty

Crises create high levels of uncertainty and threat, both perceived and real, within the general public. Because of this, many definitions of crisis have the term *uncertainty* within the definition or central to it. Crisis events are low probability but have high consequences. The characteristics of crisis cause individuals, organizations, and officials to make decisions and take actions in a limited amount of time with incomplete information. This, coupled with the unanticipated nature and potential risk of the event, contributes to the high levels of uncertainty.

The state of uncertainty is psychologically uncomfortable for humans and motivates individuals to engage in actions and behaviors to reduce uncertainty, thus gaining predictability. One way in which individuals attempt to gain certainty and predictability is through information seeking. It has been observed that after a crisis, the public will look for information anywhere they can obtain it and will constantly look for the most current and accurate information, with the media often being a dominant source.

Uncertainty can be found in several aspects of everyday life. Most common among people is financial uncertainty. This takes place when the future of certain financial investments cannot be foreseen. When probabilities are known, the investment is considered a risk; however, when probability is unknown, uncertainty is present. Stock market investments and other new investments are examples of activities with financial uncertainty. The gambling industry is built on the degrees of uncertainty for winning. Millions of people spend large amounts of money trying to win a bigger amount of money at the various game tables or machines. Another area of uncertainty can be found in weather forecasting. Though weather forecasts are issued each day, there is a consistent amount of uncertainty present in each report. Some forecasters provide the amount of uncertainty with predictions, usually involving severe weather conditions such as snowstorms or hurricanes. Mathematical calculations also carry uncertainty. Units of measurement are used, but only to a certain degree, which leaves an amount of uncertainty in the measure. Depending on the difficulty of the measurement or the calculation, the amount of uncertainty can be large or small. Thus, people deal with different levels of uncertainty in everyday life and experience more or less comfort with that uncertainty.

Always a Negative?

The dominant framing of uncertainty as a negative experience has come under criticism, encouraging some to argue that individuals potentially experience uncertainty as a positive state that can produce circumstances where individuals thrive. Thus, individuals may actually desire the experience of uncertainty. In one specific model, both arguments are reconciled with the proposition that individuals become aware of an important issue for which they desire more or less uncertainty; it is at this recognition stage that the information management process begins, not simply when experienced uncertainty is high.

Strategies other than information seeking have been identified as commonly used means of dealing with uncertainty. Noted strategies include a re-evaluation or reappraisal of the object of uncertainty or acceptance; the cause or result is inevitable. Through a reappraisal of the object of uncertainty in a crisis, an individual will reassess the potential risk, thus managing subsequent uncertainty by making psychological adjustments to change the severity of the risk. Moreover, individuals may avoid issue-relevant information rather than seeking it out. This avoidance can be active, where the individual avoids situations, people, or media that could offer relevant information that they feel will contribute to the cause of uncertainty. Alternately, passive avoidance involves a decision to refrain from active information seeking and simply allow relevant information to emerge. Each of these strategies can impede or facilitate the crisis management process.

Another way to reduce uncertainty is through cognitive dissonance. The underlying hypothesis is that the existence of dissonance causes an individual to become psychologically uncomfortable. This discomfort will drive the person to attempt to reduce the dissonance and achieve consonance. Thus, feelings of dissonance cause uncertainty or psychological imbalance, and information seeking is the dominant means used to reduce that uncertainty.

Demographic differences have been found across several studies outlining different strategies in information seeking to reduce uncertainty. For example, research after Hurricane Katrina, Hurricane Ike, the I-35W bridge collapse in Minnesota, and the terrorist attacks of September 11 outlines a consistent pattern of information seeking in women. Women were more likely than men to seek information from mediated sources, and the information sought related both to survival needs and concern for others. Other demographic differences indicate that individuals are more likely to direct information seeking toward those who possess similar attributes; thus, racial minorities have fewer similar others to target for information and fewer media outlets that are perceived as similar. Additionally, the notion that racial and ethnic minorities are less likely to accept a crisis warning message as credible without confirmation of the message from others (specifically, interpersonal networks) has been established, possibly causing differences in perceived uncertainty and subsequent reduction of uncertainty. Uncertainty has also been found to relate to the type of medium used to acquire information, time spent collecting information, and issues of self-efficacy.

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See Also: Bounded Rationality; Cosmology Episode; Decision Making; Decision Making, Theories of; Decision Making Under Stress; Information Asymmetry; Information Vacuums; Mass Media; Paradigm Blindness; Practical Drift; Risk Society; Structural Secrecy; Trauma; Trigger Events.

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UNICEF

See International Children's Fund, UN (UNICEF).

United Way

When disasters, emergencies, and crises strike a community, some of the most important actors on the scene are the nonprofits or nongovernmental organizations. In many cases, nonprofit organizations may be even faster and more effective than public/government organizations in helping the impacted communities. United Way is one of the nonprofit organizations that is active during emergencies and crises, alongside other worldwide philanthropic activities and programs. Being a global nongovernmental organization, its main goal is to advance the common good through investment in education, achievement of income stability, and attainment of healthy lives.

History and Mission

The United Way was founded by Frances Wisebart Jacobs, a woman from Denver, Colorado. It was established in 1887 through collaboration with a group of religious leaders under the name Charity Organizations Society, with the main goal to coordinate health services, relief operations, and welfare programs for local communities. The organization held fund-raising programs at that time, with allocation of funds executed through Community Chests, a widely utilized name for United Way until the 1950s. In 1918, the American Association for Community Organizations (the predecessor to United Way of America) was founded after a meeting of 12 national fund-raising federation executives in Chicago. By 1947, there were more than 1,000 United Way organizations across the United States. For the first time since its creation, in 1974 United Way raised more than $1 billion across the United States and Canada, and United Way International was founded in the same year to reach global communities in need. United Way was especially visible throughout the 1980s and 1990s through several partnership projects with such agencies as the U.S. Postal Service and the National Football League. In 1996, United Way Online for local United Ways and the United Ways Web site for the general public were introduced.

Over the years and throughout the 2000s, the agency revised its identity and shifted from its role of fundraiser to a more general and embracing role of a charity addressing long-term community needs. Today, United Way is a leading leadership, support, and community-impact organization with the network of some 1,800 community-based United Way organizations in 45 territories and countries of the world.

Volunteer Driven

United Way offers three ways people can contribute to charity efforts. The first way is simply by donating money for specific causes. As is the case with most nonprofit organizations, donations are the most important source of revenues. The second way is to advocate the agency's cause, thus contributing to enlargement of the agency's volunteer network. For nonprofits, a larger network means greater support as well as greater community impact. The third way to contribute to the agency is through volunteering for specific programs and activities administered by the agency. Volunteers are the main human capital that helps realize agency goals. All these methods of contribution are being directed to create and support innovative programs in the realm of education, income, and health that would generate impact in local communities around the world. Based on the 10-year goals that were set in 2008, United Way plans to cut in half the dropout rate in America's high schools, to cut in half the number of financially unstable low-income families, and to increase by one-third the number of healthy youth and adults by the end of 2018. To achieve these goals, the agency collaborates with several public, private, and nonprofit agencies as well as community leaders. Collaboration with different sectors as well as with other nonprofit organizations stands as a key factor and contributor to nonprofits' success today.

Crisis Involvement

In addition to the overall goals of the agency described above, United Way also has been involved in relief operations and programs in times of emergencies and disasters affecting local communities. In most cases, United Way acts as a coordinator of preparedness, response, and recovery activities through its wide network of related emergency response agencies. In addition, the agency deals with volunteer mobilization through different volunteer reception centers—the most vital labor force of nonprofit organizations. In times of disasters, volunteers help distribute food, deliver clothes, direct victims to shelters, or provide medical assistance to them. Provision of these goods and services is possible through funds raised for related causes. When a huge disaster occurs, the agency establishes a specific fund to raise money to help disaster relief and recovery operations in affected communities. The monies collected are then directed toward affected areas in the form of food, clothes, shelters, medicine, and medical equipment. If and when the money-raising campaign is over, additionally donated money is directed to United Way Worldwide's General Disaster Recovery Fund to be used to help victims of other disasters occurring worldwide. Most of the time, such money is used for recovery programs and operations requiring long-term efforts in the aftermath of disasters.

When four consecutive hurricanes struck the state of Florida in 2004 over a period of four weeks, for example, United Way played a vital role through collaboration with other agencies to help prepare for, respond to, and recover from the disasters by identifying needs in devastated communities and directing people to services like shelters, food, medical assistance, and information. The agency was similarly active in the aftermath of the earthquake followed by a tsunami that struck Indonesia and India the same year. United Way coordinated a Crisis Response Team consisting of United Way International, United Way of America, and local/regional United Way agencies in India, Indonesia, Kenya, Malaysia, and Thailand. United Way was also effective in coordinating disaster relief activities after Hurricane Katrina in 2005, in the aftermath of the earthquake in Haiti in 2010, and in the aftermath of the earthquake followed by the devastating tsunami in Japan in 2011.

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See Also: Collaboration; Coordination; Crisis, Definition of; Disaster Recovery; Earthquakes; Emergency, Definition of; Hurricanes, Typhoons, and Cyclones; Nongovernmental Organizations; Recovery.

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U.S. Geological Survey (USGS)

On March 3, 1879, the United States Geological Survey (USGS) was established when President Rutherford B. Hayes signed into law a bill to appropriate money for various civil expenses of the federal government. The USGS is a science-based organization that provides unbiased information on natural hazards that threaten people and property, changes in climate and land use, the health of the environment and ecosystems, and the core science that helps inform policy makers. The current understanding, for example, of the location of energy and mineral resources is based on fundamental scientific advancements made by USGS scientists. One of the most comprehensive data sets currently available online resulted from the cooperative efforts of the USGS and the private sector to provide digital images of neighborhoods and communities used by city and county governments for multiple purposes. A key role of the USGS is the management of wildlife, water resources, and natural hazard mitigation.

The stated mission of the USGS is to serve the United States as well as other countries by providing dependable scientific information to understand Earth; manage water, energy, and mineral resources; and lessen the loss of life and property from natural disasters. The USGS reorganized on October 1, 2010, to center on the mission areas outlined in its USGS Science Strategy. Those mission areas are climate and land use

A U.S. Geological Survey (USGS) Hawaiian Volcano Observatory geologist takes a sample of active lava within a lava tube; such samples are analyzed routinely to track changes in lava chemistry. The observatory studies the nature of volcanic processes to better understand and reduce their risks to society. The USGS, a science-based agency that provides information on natural hazards that pose a risk to humans and property, focuses primarily on the areas of wildlife, water resources, and natural hazard mitigation.

change, core science systems, ecosystems, energy and minerals, environmental health, natural hazards, and water.

One of those mission areas is natural hazards. Among the various hazards the USGS serves to monitor are earthquakes. The Earthquakes Hazard Program (EHP) is part of the National Earthquake Hazards Reduction Program (NEHRP), which is under the auspices of the National Institute of Standards and Technology (NIST). A sophisticated telecommunications network is connected to geophysical sensors to provide the Global Seismographic Network (GSN) in order to detect seismic activity and better warn communities that might be at risk.

Volcanoes

Also under the watchful eye of the USGS is volcanic activity. The Volcano Hazards Program (VHP) was established to advance the understanding of volcanic processes and to mitigate the damage caused by volcanic activity. Similarly, the Landslide Hazards Program (LHP) is designed to further the understanding of slope dynamics to improve the understanding of landslides and their associated hazards in order to increase public safety and mitigate the damage they can cause. The USGS also has a Coastal and Marine Geology Program that monitors ecosystem health and changes in the marine environment, whether from natural or anthropogenic forces.

Floods, Earthquakes, and Mud- and Landslides

An example of the international work of the USGS is a system of rain gauges, satellite telemetry, and communications equipment in Haiti. In and around the town of Fond Verettes, this infrastructure provides an EWS, or early warning system, for potential flood victims. After the damaging rains and mudslides that accompanied Hurricane Mitch in 1998, the USGS installed a network of 58 hydrologic monitoring systems with real-time warning capacities in four Central American countries. In addition to monitoring stream height to reduce risk, the USGS also provides technical advice, rehabilitation aid, and reconstruction assistance to manage flood crises.

Traditionally, the USGS has been associated with earthquake monitoring and landslide damage. Recently, however, the use of computer technology has enhanced the rigid sliding block analysis that is used to predict the potential for landslides resulting from earthquake activity. These models can be used with shake maps to generate near-real-time slide maps that are a valuable tool used in crisis management. Shake maps use ground motion data from an actual earthquake event to predict sliding displacements. Slope characteristics, such as geometry, strength, and material cohesion, along with the characteristics of earthquake activity, such as peak ground acceleration, wave frequency, and amplitude, are used to develop seismic landslide hazard maps. The maps identify various zones at risk of earthquake-induced landslides and serve to enhance the capabilities to manage these types of natural disasters.

Tsunamis

The USGS joined forces with the National Oceanic and Atmospheric Administration (NOAA) and the Federal Emergency Management Agency (FEMA), along with several state governments, to establish the U.S. National Tsunami Hazard Mitigation Program (NTHMP) in 1996. More than 113 coastal communities with more than a million residents are covered by the 22 tsunami inundation maps. Additionally, the tsunami warning centers are better able to locate and determine the size of earthquakes through an upgraded seismic network. Through use of numerical models and deep ocean tsunami data, the tsunami forecasting capability was enhanced. The crises associated with tsunamis can be disastrous, as evidenced at the coastal nuclear power plants in Japan on March 11, 2011.

Biodiversity and Extinction

The USGS has a reputable history of wildlife management. Recently, in light of rapid development and unmanaged human population growth, the organization developed a comprehensive approach to managing the western U.S. human footprint. Models have been generated to estimate the effects of anthropogenic features such as urbanization, road building, and power lines on the ecology of a region. The effects of human-initiated fires, exotic plant introduction, the presence of domestic dogs and cats, habitat fragmentation, and energy extraction were analyzed for their impact on native species. The results were diverse, depending on whether the area was a low-lying productive private landholding or a high-elevation, nonproductive federal landholding. The footprint models, however, will enable managers to better plan land use, develop restoration projects, and identify areas of high conservation importance. This type of modeling could be used to ward off species extinctions and the crisis of biodiversity loss.

Surface and Groundwater Contamination

The USGS also analyzes the attitudes of farmers toward best management practices (BMP). Factors influencing whether a farmer will adopt BMPs include access to high-quality information, financial capacity, and being connected to a local agency or a network of farmers or watershed groups. The data and how they are presented is important in determining the adoption of sustainable conservation practices. Crises such as the contamination of freshwater aquifers or surface waters can be avoided by the adoption of some relatively simple and low-cost management practices.

Integration and Prevention

In July 2001, the USGS joined in a collaborative effort with the National Aeronautics and Space Administration (NASA) and the National Science Foundation (NSF) by inviting proposals for high-risk planning projects to initiate environmental problem-solving activities at the local level. The relatively new field of biodiversity and ecosystem informatics (BDEI) incorporates the work of biologists and natural resource managers with computer scientists to solve real-world problems while advancing the contributory ecological, computer, and information sciences. BDEI offers an integrated and comprehensive approach to crisis management.

The USGS works with more than 2,000 tribal, local, and state governments; the federal government; nongovernmental organizations; the academic community; and the private sector to better manage crises. To provide crisis managers with unbiased scientific information, the USGS monitors seismic activity and geodesic satellite data; assesses landslide activity; maintains mapping facilities, such as the Earth Resources Observation and Science data center in Sioux Falls, South Dakota; provides flood warnings; and manages biological science and technology centers. The information is used to direct recoveries and communicate with the public effectively during times of crisis.

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See Also: Avalanches and Landslides; Dams, Levees, and Seawalls; Drought; Earthquakes; Fires; Floods; Tsunamis; Volcanic Eruptions.

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V

Vaccinations

Vaccination is the administration of antigenic agents (vaccines) to stimulate and enhance an individual's immune system to develop adaptive immunity to a disease. The adaptive immunity helps the individual by preventing or ameliorating health hazards caused by potential pathogens. Since its debut through the work of Edward Jenner in the 18th century, vaccination has been widely recognized as both beneficial and cost-effective in the battle against communicable disease crisis. For example, pre-pandemic vaccines are produced and stockpiled before a pandemic occurs. The availability of an effective pre-pandemic vaccine could potentially reduce the impact of a pandemic by reducing the severity of illness and death.

At present, the number of vaccine doses administered worldwide keeps increasing as new vaccines are developed and made available and accessible to more people. Crucially, the international health community strives to leverage its resources to achieve the following goals: (1) providing safe and effective vaccines, (2) sustainably introducing affordable new vaccines, (3) establishing a stable and comprehensive vaccine supply chain, (4) improving vaccine coverage for the targeted population, and (5) promoting vaccination policies. Although the goals of immunization programs are to raise public awareness of vaccination, they simultaneously also generate controversies.

Controversies of Vaccination

The effectiveness of vaccination relies very much on a certain percentage of the targeted population being immunized. It is generally agreed that maximizing the benefits of vaccines requires relatively high and sustained coverage levels for herd immunity to be achieved and susceptible individuals not to accumulate. Although immunization has successfully reduced the incidence of vaccine-preventable diseases (VPDs), vaccination can lead to both minor and, rarely, serious adverse reactions (side effects) in some vaccine recipients. Controversies about vaccine safety develop primarily because adverse events that take place after vaccination (AEFIs) may include known reactions to vaccine as well as events coincidental to, but not caused by, vaccination.

Concerns about AEFIs undermine the public acceptance of vaccination and the success of vaccination programs. Paradoxically, it is because of the success of vaccination programs that concerns over vaccine safety are most likely to arise. This is because patients and health care providers no longer have any firsthand experience with VPDs that are at record low levels. However, these concerns, along with anecdotes and rumors around AEFIs reported in the media and social networks,

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A health worker in the Democratic Republic of Congo (DRC) administers a polio vaccine, March 23, 2011, in Commune de Ndjili, Kinshasa, as the minister of health launched a vaccination campaign against the wild polio virus. Ten new cases of polio had been reported in the capital city since January. More than 8.6 million Kinshasa residents were expected to receive two doses of vaccine during the March 23–27 campaign, aided by USAID, the World Health Organization, the United Nations Children's Fund, and other partners.

can spread quickly and result in loss of public confidence in vaccines. Consequentially, such concerns are responsible for decreased coverage levels, leading to disease outbreaks—an ultimate resurgence of VPDs with considerable morbidity and mortality.

Challenges of Vaccination

In today's interconnected world, most public health interventions inevitably confront challenges. Two of the challenges that hinder the effectiveness of vaccination are considered the most relevant: (1) public confidence in vaccination and (2) sustainable financing for immunization programs.

The pattern of public reluctance to vaccines has been observed for many years in several countries, including Japan, the United Kingdom, Nigeria, and the United States. Accordingly, several industrialized countries have routinely adopted strategies and instruments that combine active and passive surveillance to monitor AEFIs to address the public's safety concerns. For example, presenting the scientific evidence that the vaccines are safe and effective and that VPDs are serious has been the primary strategy for addressing vaccine concerns. In contrast, low- and middle-income countries (LMICs) present a different challenging situation in vaccination—one that is more intricate. As immunization programs have expanded in recent decades, the problems of vaccine refusal/hesitance in LMICs have become more rampant, but only a small proportion of LMICs have functional vaccine safety systems that serve to assess AEFIs and guard recipients' health.

Attempts to refute the safety concerns through scientific studies are important but have not been sufficient to maintain public trust for all because, apart from a relatively limited number of vaccination specialists, there is insufficient public or political awareness of the scientific, regulatory, logistic, and economic challenges faced by immunization and the resulting stakes for human health. New strategies in vaccine risk and benefit communication have been recommended to shape vaccine beliefs and behaviors. The potential strategies include but are not limited to enhancement of knowledge of vaccine safety systems, transparency and accountability in vaccine decision making, and mobilization of societal and personal influences to prompt individuals and families to consider community incentives for high coverage rates.

To reach herd immunity, it is pivotal to build a safe vaccine supply chain and to increase immunization coverage for the targeted population. This of course is dependent on a robust health system supported by sustainable financing. In resource-limited countries where adequate health infrastructure is not in place, vaccination encounters a series of challenges. Given the scarce resources and fiscal constraints, however, it is rather difficult for most LMICs to maintain sustainable routine vaccination programs, not to mention expanding the vaccination scope to cover unexpected public health threats, such as avian influenza. The whole world is still striving to seek innovative resolutions to these pressing challenges.

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See Also: Epidemics; Infectious Disease; Influenza; Pandemics; World Health Organization (WHO), UN.

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Vital Records

Vital records are official records, usually maintained by state or county governments, of major life events. They include birth certificates, death certificates, marriage licenses, certificates of adoption, and closely related legal decrees. The term is also used more broadly to refer to those records that are vital in the sense of “being of critical importance” rather than of “pertaining to life,” especially when one refers to the vital records of a business, government, or other entity. In such cases, vital records are those records that are most important to the entity’s continuity of operations. These would include tax documentation, personnel records, financial records, records of contracts and other agreements, permits, licenses and regulatory information, and other records the entity needs to refer to (or provide to outside authorities) in order to persist in its operations. For instance, a hospital’s vital records would include medical records of current and previous patients, personnel records, and inventory, among other information. For individuals and households, critical records may include property deeds and mortgages, financial and tax information, insurance information, passports and other identification, and investment documents such as bonds or certificates of deposit. The recovery or reconstruction of vital records is one of the key challenges following a disaster or other crisis that has jeopardized them.

The protection of records has long been a concern of preparedness advocates. In early American

Case Study: Vital Records Management During Hurricane Katrina

In 2005, Hurricane Katrina unleashed severe damage on the Gulf Coast from Florida to Texas, as well as causing the catastrophic failure of the New Orleans levee system, resulting in the worst flooding some parts of the city had ever experienced, hours after the storm itself had moved inland.

The hurricane is widely viewed as a series of crisis management disasters from the late call of New Orleans' mandatory evacuation (and lackluster evacuation plan), to the failure of a levee system that was supposed to sustain much more damage than it did, to the slow response of the federal government and consistent mishandling of disaster relief efforts by the Federal Emergency Management Agency (FEMA).

Because of the significance of the toll taken by the storm—not just in New Orleans, where a large portion of the population was forced into a diaspora as so much of the city remained uninhabitable for so long, but also in the Mississippi and Alabama towns that were almost completely flooded—it is not often described as a records management disaster. But the broad geographic scope of the storm meant that a great many more records were lost or destroyed than in most U.S. natural disasters, and the aftermath has been an object lesson in the need for record management systems that account for the possibility of catastrophe.

Preexisting Problems

Two of the major underlying problems with the records management in the area affected by Katrina were matters of mind-set. It became clear that private individuals (and businesses) had a tendency to assume that any record in the government's care would be safe—that marriage licenses and birth certificates, for instance, could be replaced if lost, because the government retained a copy of them.

What this mind-set ignores is the physical reality of the government's records; they exist not as Platonic ideals that can be generated by the government upon request, but as real physical objects, whether as paper forms in a filing cabinet or data on a hard drive or other digital storage medium. This leads to the second underlying problem: the tendency to treat potential catastrophes as local phenomena. Even along the hurricane-prone Gulf Coast, there was evidence, again and again, of habits that belied the belief that disasters, should they occur, would occur in a small area: emergency response plans were developed with that unspoken assumption, and emergency supplies in too many cases were stored within the affected area, making them difficult to locate or vulnerable to destruction by the forces of nature.

Records Lost

Enough institutions failed to take even the very basic precaution of storing records on top floors—where vulnerability to flooding is much reduced—that Tulane Medical Center was praised for keeping its paper records in a second-floor office. However, it still faced a major records management problem: because health information management personnel are considered nonessential personnel (in that they do not provide medical care), Tulane's 100 full-time staffers were evacuated once the evacuation order was declared, requiring the involvement of the chief information officer to find medical records for incoming patients. Further, in some cases when patients were evacuated, their medical records were sent with them, without backups being made; in the tumult of evacuation, those records were often lost. (One of the changes Tulane has made since Katrina has been to decentralize its data.)

In the cases of some local governments, the government's own emergency response plan was inaccessible, either temporarily or permanently, whether because it was kept in a building destroyed by the storm or because it existed only as digital data inaccessible during a power outage.

Many local companies had failed to use remote data backup services, slowing the economic recovery of the region as the cost of resuming business rose—and in some cases proved prohibitive, leading to many permanent closures and more than a few simple abandonments. Emergency plans simply failed to account for all the effects of Katrina.

history, fires—which were especially difficult to control in the age before gas-powered fire engines, chemical fire extinguishers, and powered water pumps—regularly destroyed entire cities' worth of records. As civilization and government became more sophisticated, this became more and more of a problem, as proving one's identity, age, or marital status, or establishing the death of an individual, becomes a bureaucratic necessity one faces on a frequent basis. Businesses and governments have become more bureaucratic in their operations, producing records at a frequency and volume that even 19th-century businesses could not have imagined.

Modern Methods of Preserving Records

As the vulnerability of records posed a greater and greater danger, innovations were introduced, such as fireproof safes and vaults, redundancy (keeping multiple copies of records in multiple sites), and eventually backups made possible by technology, including photocopies and digital copies. Today, archivists, record managers, and crisis management experts strongly advocate the adoption of off-site digital storage of records. Although it may seem simple, digitizing nondigital records can be a laborious process; not every company has a scanner, and older records may be of a nonstandard size that requires multiple passes with a scanner and a greater degree of attention. Hundreds or thousands of hours of labor may be involved in converting an organization's physical records to digital copies, and accurately filing and categorizing those records may require the oversight of a skilled employee; further, in some cases, records may contain information that is confidential or protected, making it unwise or even illegal to outsource the work or delegate it to a low-level employee. In addition, there are cases in which creating copies of records that have the same legal standing as the originals is either impossible or requires special procedures of authentication.

Converting from older storage methods is time-consuming as well. Paper is fragile and ages poorly; photocopies may be faint or, if the source record was poorly aligned, may cut off part of the original; microfilm and microfiche not only age, but in many cases the transfer of records to these formats may have introduced errors by cutting off or smudging the document; and early digital storage used media no longer in use, such as cassettes or floppy disks. Very old records may raise issues requiring handling by an expert with special training: handwriting styles have changed considerably even since World War II, and much more drastically compared to earlier centuries, while industry-specific terms may change meaning over time sufficiently to obscure their meaning. Depending on the nature of the records, some foreign language fluency may be required, especially when dealing with government records. Records that have not been well managed may require the attention of forensic experts in order to determine both their authenticity and their vintage.

Records Management

The discipline of records management was originally concerned only with older records, as organizations realized there could be benefits to preserving records no longer in use; such inactive records were usually stored in a basement or other out-of-the-way facility, and records managers were charged with preserving and organizing them. Today, records management has become a more sophisticated field—a large enough organization may have an entire records management department, responsible for setting policies, standards, guidelines, and procedures related to the creation and handling of records from the moment of creation to the end of their life cycle. Identity and data theft issues, privacy breaches, and the challenge of records loss during such disasters as the September 11 attacks, the Indian Ocean tsunami, Hurricane Katrina, and the Haitian earthquake have put a spotlight on the field of records management in the 21st century.

Ideally, vital records are stored in disaster-resistant facilities, such as a weather-, temperature-, and impact-resistant safe on-site or an off-site location; many households keep their vital records in a safe deposit box at their bank, which helps in the event of a disaster that strikes their house or neighborhood but may prove insufficient protection against a wide-scale disaster such as an earthquake, tsunami, or hurricane.

The management of electronic records is a discipline still very much in flux. Technology changes so rapidly that both storage media and file formats become obsolete in what is an extremely short period of time, from a management point of view. Some file formats are proprietary, associated with specific software that in all likelihood will someday be discontinued or radically altered. Record keepers very often forget that digital storage media are no more immortal than paper is; they decay over time and may become unreadable. Computer technology is new enough that the longevity of storage media remains essentially untested compared to that of paper records or even photographs. Retrieving records from damaged media can require highly specialized skills, which themselves obsolesce over time; it may be too much to expect the record managers of the 22nd century to be well versed in the technology of the 20th and 21st centuries and the hardware- and software-specific skill sets necessary to handle records dating from that time. Some historians worry that although digital storage media protect records in the short and medium term from catastrophe, they offer significantly worse protection against the normal degradation of age (and are much more expensive to repair than older media), and this will result in a records gap. Even aside from the concerns of historians, this has bearing on government records that need to be kept for legal, policy, and pragmatic reasons.

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See Also: Business Continuity Management; Continuity of Government; Disruption of Organizations; Electronic Media; Electronic Vaulting; Preparedness.

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Volcanic Eruptions

In the United States, there are more than 65 active or potentially active volcanoes. This is more than the number of volcanoes in every other country except Japan and Indonesia. During the 20th century, volcanic eruptions in Alaska, California, Hawaii, and Washington devastated thousands of square miles of land and caused enormous financial losses, societal disruptions, and loss of life. In the past two centuries, more than 50 volcanoes have erupted in the United States one or more times. Worldwide, approximately 550 volcanoes have erupted in historic times, and at least 1,300 have erupted during the Holocene.

Eruptions often affect more than just the area in the immediately vicinity of the volcano. Ash clouds from very explosive eruptions threaten numerous aircraft along busy flight paths, ashfall can devastate areas downwind, and large eruptions influence global climate patterns as well as agricultural production. There have been major advances in the understanding of volcanoes in recent years. These strides were made from detailed studies of eruptions and from advances in global communications, remote sensing, and interdisciplinary collaboration.

U.S. Geological Survey

Monitoring and responding to volcanic activity falls under the watchful eye of the U.S. Geological Survey (USGS). The USGS, established in 1879, is a science-based organization that provides unbiased information on natural hazards that threaten people and property, on changes in climate and land use, and on the health of the environment and ecosystems and provides the body of science that informs policy makers. The USGS reorganized on October 1, 2010, to center around the mission areas outlined in the USGS

Science Strategy. One of those mission areas is natural hazards; among those natural hazards are volcanoes.

Volcano Hazards Program

The Volcano Hazards Program (VHP) was established as a part of the USGS to advance the understanding of volcanic processes and to mitigate the damage caused by volcanic activity. Volcanic eruptions are some of the most fantastic displays in the natural world, and a high-magnitude eruption or a volcano that is in close proximity to a population center can result in large-scale economic and social disaster. Recently, the United States has experienced only one major eruption near a large metropolitan area. In 1980, Mount St. Helens near Portland, Oregon, erupted. More than 50 people died, and there was formidable damage to forests used for timber extraction as well as to the area's infrastructure. However, the greatest impacts were confined to sparsely populated rural regions in the state of Washington. Recent eruptions in Alaska and Hawai‘i have had only local impacts.

Components of the VHP

Tracking volcanoes through the Volcano Hazards Program (VHP) is a complex task that starts with fundamental research on the processes determining the manner and magnitude of volcanic eruptions. Research provides the basic scientific concepts that determine the methods of data collection, analysis, and interpretation. The program's oversight involves three operational components. There is an assessment of a particular hazard based on past history. A major challenge in the assessment phase is deciding which volcanoes to study and the level of detail to employ. There is also a continuous monitoring system of warning signs that can indicate early development of an eruption.

Monitoring involves measuring geodetic, geophysical, and geochemical attributes, and comparing those data with baseline observations that allow changes to be recognized. Also, scientists design a crisis response strategy to be implemented after a large eruption occurs. A successful response involves the rapid deployment of people and equipment as well as clear communication with the general public and with civil defense officials. The outreach stage focuses on these communications and is designed to inform the public and officials about the potential risks from volcanoes.

The VHP has an international presence as well. A team of scientists and technicians assists foreign governments with volcano hazard mitigation. This Volcano Disaster Assistance Program (VDAP) is partly supported by the U.S. Agency for International Development (USAID) and has conducted more than a dozen successful deployments in the past decade. For example, in 1991, members of the VDAP helped fellow scientists in the Philippines during the massive Mount Pinatubo eruption. This cooperative effort saved tens of thousands of Filipino lives and millions of dollars in equipment at two U.S. military bases.

Pacific Northwest and Air Travel

Rapid population and economic growth in the Pacific Northwest have placed greater numbers of people and critical industries closer to the region's volcanic peaks. The United States has major sleeping volcanoes, including Mount Rainier and Mount Baker near Seattle-Tacoma in Washington and Mount Hood near Portland. Additionally, very busy North Pacific air routes traverse more than 100 active Alaskan and Russian volcanoes daily. These flights place millions of dollars of cargo and more than 10,000 people at risk every day. An undetected and sudden eruption of ash could easily bring down a 747 by bombarding its engines with a cloud of molten silica. Finally, economic globalization causes financial markets to become increasingly vulnerable to volcanic disasters anywhere across the globe.

Mount Rainier

The first volcanoes to receive intense study in the United States were Mauna Loa and Kilauea on the big island of Hawai‘i. The basaltic lava they release is of low viscosity and flows toward the sea, somewhat like a plastic river. However, the Cascade Range in the Pacific Northwest harbors a high-viscosity, silica-rich magma that causes far more explosive volcanoes. Mount Rainier, in the Cascade Range, is being closely monitored by the Cascade Volcano Observatory (CVO).

Mount Rainier has been a high-priority volcano for study since the 1990s, and the first indication that Mount Rainier was reawakening arose from crustal deformation measurements at the CVO. A dense network of permanent global positioning system (GPS) receivers in the area detected slight ground movements (less than 1 millimeter) almost a year prior to the eruption. The subtle motions would not have been noticed by observing data from a single instrument; only complex computer programs specifically designed to compile numerous data sets and to seek out signals indicative of magma migration were able to distinguish the preliminary warning signs.

Data from a cluster of Interferometric Synthetic Aperture Radar (InSar) satellites orbiting Earth were also critical. Satellites record images of the surface of Earth, and these images can be combined with GPS data to show subtle movements of the ground surface, or deformation. Analysis software detected inflation of part of a deep magma chamber 10 miles beneath Earth's surface. The deformation group's scientists began to double-check the validity of the data and the computer modeling and called in the leaders of the other scientific groups. The scientists in charge did not have to be reminded that Mount Rainier posed the highest risk of any volcano in the continental United States.

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See Also: Air Travel; Avalanches and Landslides; Disaster, Definition of; Public Awareness and Education; Risk Assessment; Vulnerability; U.S. Geological Survey (USGS).

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Volunteer Coordination

Volunteers are valuable resources for disaster and emergency management, but spontaneous volunteer convergence after crisis may hinder the effectiveness and efficiency of response. Appropriate volunteer coordination is a key determinant of successful emergency response and recovery. Therefore, several public and nonpublic organizations at all levels are established for better volunteer coordination under the direction of related emergency policies.

Volunteers and Volunteer Convergence

The National Response Framework of the United States defines a "volunteer" as any individual accepted to perform services by the lead authorized agency when the individual performs services without promise, expectation, or receipt of compensation for services performed. Generally speaking, there are two kinds of volunteers: the first is organized volunteers who are affiliated with a recognized voluntary organization, and the second is the spontaneous volunteers who offer to help or self-deploy to assist in emergency situations. In most cases, the affiliated volunteers are trained, more professional, and better organized compared with unaffiliated volunteers. In the United States, some nongovernmental organizations (NGOs) are members of Voluntary Organizations Active in Disaster (VOAD). The organized volunteers can be subdivided into two categories: the ones affiliated with VOAD or National VOAD members and the ones attached to other NGOs or organizations.

Volunteer convergence, the movement of large number of volunteers toward a particular point, is a prevalent phenomenon after disasters. The

A row of shelter dogs eagerly wait for volunteers to walk them, June 24, 2011. At the peak of the Souris River flooding crisis in Minot, North Dakota, over 500 pets of evacuees were temporarily sheltered at the Souris Valley animal shelter and cared for by volunteers. Although volunteer engagement is a valuable resource for crisis management, appropriate volunteer coordination is critical for successful response and recovery. Volunteer enthusiasm and convergence can overwhelm a local system's ability to utilize volunteers.

personnel, informational, and materiel convergence can bring benefits as well as challenges. From one aspect, volunteers can be a significant resource of timely manpower, skills, and abilities. They can provide valuable insight, resources, and service to meet local community needs when local communities are disrupted and resources are limited after disasters. However, spontaneous and unorganized volunteers can also impede disaster response by creating health, safety, and security issues to the stressed local first responders. Therefore, in some cases, overwhelmed local communities have to turn volunteers away because they are either ill equipped or unneeded. In order to solve this paradox—people's willingness to volunteer versus the local system's capacity to use them effectively—appropriate volunteer coordination and management is necessary.

Policies and Public Coordination Organizations

The Robert T. Stafford Disaster Relief and Emergency Assistance Act in the United States treats nongovernmental disaster relief and assistance organizations as important stakeholders because they can provide resources and services during and after a major disaster or emergency. When a disaster or emergency is declared, a "coordinating officer" is designated by the president immediately to coordinate the disaster relief activities among different organizations. He/she will take the main role of coordinating the administration of disaster relief within the affected areas—not only the activities among state and local governments but also coordinating with nongovernmental disaster relief organizations like the American Red Cross, with the agreement to operate under his/her advice or direction.

The National Incident Management System (NIMS) is a management system designed to enable federal, state, tribal, and local governments; nongovernmental organizations (NGOs); and the private sector to work together to mitigate, prevent, respond to, and recover from the effects of incidents, regardless of cause, size, location, or complexity. The NIMS can be used to verify available, qualified emergency response personnel, including registered volunteers, quickly and accurately.

At the local level, the local emergency operations center (EOC) is the physical location where multiagency coordination occurs. Coordination, communication, resource allocation and tracking, and information collection, analysis, and dissemination are the core functions of an EOC. EOCs can be permanent or temporary organizations directed by a full-time emergency manager or appointed official.

The state emergency operations center (EOC) is the physical location where multiagency coordination occurs at the state level. A joint information center (JIC) may be established to coordinate emergency information and other public affairs functions. The state coordinating officer (SCO) plays a critical role in managing the state response and recovery operations following a disaster declaration, and the governor is responsible for requesting federal assistance for incidents within his or her state. A joint field office (JFO) and unified coordination group (UCG) may be established with officials from state and key federal agencies. The JFO is led by the UCG, which comprises specified senior leaders representing interests not only of state, federal, and local jurisdictions but also the private sector and NGOs. The unified coordination group typically consists of the principal federal official (if designated), federal coordinating officer (FCO), state coordinating officer, and senior officials from other entities with primary statutory or jurisdictional responsibility and significant operational responsibility for an aspect of an incident. The composition of the UCG will vary depending upon the scope and nature of the incident and the assets deployed in support of the affected jurisdiction.

The National Operations Center (NOC) is the primary national hub and a continuously operating multiagency operation center across the federal government for incident management. The National Response Coordination Center (NRCC), which is the Federal Emergency Management Agency's (FEMA) primary operations management center, and the National Infrastructure Coordinating Center (NICC) are the main components of the NOC, providing integrated mission support. FEMA can also call up response support through 15 Emergency Support Functions (ESFs) and eight Support Annexes. The ESF #6, Mass Care, Emergency Assistance, Housing, and Human Services, and the Volunteer and Donations Management annex are the most relevant with voluntary organizations.

At the regional level, FEMA also has a voluntary agency liaison (VAL) to foster a strong rapport among all the voluntary agencies and the FEMA regional offices. The VAL plays the connection and coordination role between federal agencies and voluntary organizations—not only sharing information about federal disaster-related programs and policies with NGOs but also providing voluntary agencies a role in a specific region and serving as principal contact.

Organized Volunteer Coordination

In addition to public coordination organizations, several other organizations are also created to help voluntary agencies address the challenges and coordinate their roles and services to provide more effective service to disaster survivors. These coordinating entities mainly include the National Voluntary Organizations Active in Disaster (NVOAD) and state and local Voluntary Organizations Active in Disaster (VOAD).

NVOAD was created in 1970 in Washington, D.C., by representatives from seven voluntary agencies active in disasters to improve single NGOs' fragmented, uncoordinated manners of disaster response. NVOAD grew rapidly and became a forum where organizations can share knowledge and resources throughout the disaster cycle to help disaster survivors and their communities. At present, National VOAD comprises approximately 50 national nongovernmental organizations and 55 state and territory equivalents.

During major crises, NVOAD typically sends representatives to the Department of Homeland Security/FEMA's National Response Coordination Center to represent the voluntary organizations and assist in response coordination. The members of NVOAD must commit to working together, not competitively, toward the goal of effective service to disaster survivors. Through careful planning and preparation, NVOAD helps its member organizations behave in a coordinated manner in time of disaster. NVOAD accomplishes it mission in several ways: meetings, education, outreach, publications, and representation of disaster-related concerns to the government.

Agents at FEMA also know the importance of developing strong working relationships among government agencies at all levels and the voluntary agencies at all levels in emergency management. FEMA participates in the annual meetings and other activities of both National VOAD and state VOAD members. Meanwhile, FEMA maintains its Memoranda of Understanding (MOUs) with individual voluntary agencies and works closely with NVOAD member organizations individually. FEMA contributes to increasing the public awareness of NVOAD, provides financial support and training to NVOAD and VOAD members, and assists them to develop partnerships among the NGO members and the private sector. NVOAD encourages information sharing among its members and FEMA, assists FEMA after a major disaster strike by convening meetings of the voluntary sector to coordinate an effective response and recovery, and encourages disaster engagement through outreach, education, and local community involvement both before and after disasters occur.

In addition to VOADs, some other nongovernmental organizations and businesses also provide volunteers for disaster preparedness and response. Some companies have already established volunteer programs and encourage their employees to do volunteer work for communities. Also, some local citizen corps programs can be used to recruit, train, and maintain emergency management volunteers.

Spontaneous Volunteer Coordination

Spontaneous volunteers, also known as unaffiliated volunteers, are those who offer to help or self-deploy to assist in emergency situations without fully coordinating their activities. For example, if a train accident happens, nearby residents may rush to the accident site to help. These volunteers can supply some immediate assistance to the initial emergency response, but they can also present significant challenges. For example, after the September 11 terrorist attacks in 2001, hundreds of people from both in and out of the state showed up in the small "ground zero" areas directly affected by the event. Though these people came with good intentions and willingness to help, they actually created a logistical nightmare for professional emergency responders and volunteer coordinators.

The best way to deal with spontaneous volunteers is to change them into trained and affiliated volunteers. A contingency plan to deal with spontaneous volunteer convergence is necessary for effective response. Some basic screening methods can be developed, depending on the skills needed and the training situation of each volunteer. Work that does not need many professional skills can be designated for these unprofessional volunteers. Local emergency managers can also coordinate with some VOAD members or other professional NGOs and ask them to provide the necessary training to these show-up volunteers. The trained volunteers also can take the role of trainer when there is a lack of professional personnel. Finally, effective communication is very useful to prevent useless volunteer convergence while attracting needed volunteers.

In addition to coordinating with other NGOs, some local emergency managers prefer to develop their own volunteer programs. In this situation, first an agency and program needs analysis is necessary. Then a well-written volunteer job description can be disseminated. The following steps are recruiting, placing, training, supervising, and evaluating volunteers. Finally, a program evaluation can be implemented.

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See Also: Collaboration; Contingent Coordination; Coordination; Coping Capacity and Response Capability; Crisis Communications; Department of Homeland Security (DHS); Disaster Declaration; Disaster Declaration Officer; Doctors Without Borders; Emergency Operations Center; Emergency Public Information; Emergency Responders; Emergency Support Functions; Federal Emergency Management Agency (FEMA); Incident Management; Incident Response; Mutual Aid and Assistance; National Incident Management System (NIMS); National Response Framework; Nongovernmental Organizations; Office for the Coordination of

Humanitarian Affairs (OCHA), UN; Operational Plans; Response; Response Team; Salvation Army; Stafford Act; State Emergency Management Agencies.

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Vulnerability

Vulnerability represents the potential for harm incurred by a person, asset, activity, or assemblage of items that is at risk. In the present context, the risk is motivated by natural, technological, social, intentional, or complex hazards and the potential outcome is disaster. As it is mainly the result of social, economic, political, and cultural factors in decision making, vulnerability is constructed socially. It is usually assessed or measured in terms of the potential degree of loss likely to result from a particular hazard or assemblage of hazards of a given magnitude.

Hazard Plus Vulnerability Equals Risk

In the analysis of disaster, risk is basically the product of hazard and vulnerability. Studies carried out in the late 1970s and early 1980s called into question the primacy of the former over the latter and suggested that, as a result of feedback mechanisms, vulnerability is the most important component of risk and the one factor that is most likely to explain it. One problem with both risk and vulnerability is that they are not tangible quantities. In the same way that friction comes into existence when it is mobilized by resistance to a force, so vulnerability is fully manifest only when hazards materialize and threaten a person, asset, or activity. This complicates both the measurement and the understanding of the phenomenon. However, it can be estimated using indicators, which must be applied to whichever of its fundamental dimensions are most important: physical, environmental, social, economic, cultural, health-related (medical and psychological), and institutional (including political). Given that it is a multidimensional phenomenon, vulnerability tends to be complex, with linkages and consequences that affect many socioeconomic processes. In synthesis, the vulnerability approach begins with the principle that people, not physical forces, are the most fundamental cause of risks and disasters. Hence, there is a growing tendency to focus on the vulnerability of communities, because, although the approach can be used at any scale from worldwide to individual, disaster risk reduction must begin at the local level if it is to be successful.

Vulnerability to disaster is often equated with poverty. In strict terms, the two are not entirely synonymous, as poor communities are sometimes able to organize and defend themselves against hazard impacts with some degree of success. This is especially true of indigenous knowledge on how to adapt to hazard, which may have accreted over decades or centuries of attempts to regulate impacts by trial and error. However, it is well known that the world's poor are the most vulnerable, especially where they are marginalized by mainstream political and economic forces. Such groups lack the resources and the political power to reduce hazard impacts. Accordingly, the vulnerability approach to disaster risk reduction, which pays particular attention to social justice, prefers a 'bottom-up" or grassroots approach, and one that is based on "soft" rather than "hard" measures—that is, it gives preference to social organization, management, and administrative measures (such as land use control) over engineering solutions to hazard problems. Many studies of disaster have shown that the key to success is to encourage participatory governance, or in other words, to give people and communities a stake in the process of managing and reducing their own vulnerabilities and increasing their own resilience.

In disaster studies, the investigation of hazards, particularly those of geophysical origin, has slowly given ground to the examination of vulnerability, starting with physical susceptibility to the generation of casualties, damage, and destruction, and moving on to social, economic, and cultural fragilities. There is now a movement to progress from this to the active search for means of increasing resilience and thus to turn a negative focus of study into a positive one that places more emphasis on solutions. This begs the question of the extent to which vulnerability is the opposite of coping, capacity, and resilience. Certainly, reducing vulnerability is an essential prerequisite for increasing resilience, and coping mechanisms need to be invoked to do so yet vulnerability reduction is not the only factor in resilience, which requires a combination of participation, communication, adaptability, attitude, and redundancy. Nevertheless, resilience is unlikely to be achieved unless vulnerability is well understood, both as a phenomenon and as a set of dynamic processes.

In the modern world, there is a continual dialectic between processes that create vulnerability and those that reduce it. For example, the world's 23 "megacities" (metropolises with populations of more than 10 million) are continually extending into areas threatened by hazards such as flooding, landslides, and ground subsidence. At the same time, building codes, land use control measures, and the organization of emergency management services all contribute to reducing the potential impacts of future disasters. It remains to be seen which of these opposing forces will triumph. In the meantime, several different trends are making societies more vulnerable. Increases in population are particularly significant in areas of high hazards, such as world's coasts, including those at risk of tsunamis, storm surge inundation, and sea-level rise. Social and technological complexity are relentlessly increasing: one major source of vulnerability is the degree of interconnectedness in world commerce, such that disruptions in one area may have repercussions for economic activities in places that are otherwise quite unaffected by the impact. Thus, the eastern Japanese (Tohoku) earthquake and tsunami not only shut down the automotive industry in the area of direct impact but also reduced production in other countries and continents, as a result of supply-chain failures.

Vulnerability Assessment

In 1982, a seminal publication by UNESCO and the United Nations Disaster Relief Organization (UNDRO) defined vulnerability as "the degree of loss to a given element or set of elements at risk resulting from the occurrence of a hazardous phenomenon of a given magnitude. It is expressed on a scale from 0 (no damage) to 1 (total loss)." This was intended to enable inventories of vulnerability to be compiled by assessing the different elements and summing or averaging the results on a proportionate scale. Vulnerability assessment is complicated by the need to investigate diverse phenomena (such as the structural robustness of buildings and the quality of mental health under duress). It also involves varied geographical scales (indeed, it is often scale-dependent) and dynamic processes subject to different speeds and rhythms of change.

Measuring vulnerability in the 21st century involves probing concepts such as "susceptibility" and "fragility." It requires that vulnerability be differentiated from "exposure," which may mean that an asset, or a community, is in the line of attack by a potential hazard but does not indicate the extent to which it is at risk of a particular level of harm. Hence, an electrical-power generating station may be exposed to flooding because it is located in a floodplain or on a coast, but it may not be very vulnerable if measures have been taken to protect it against inundation.

Two alternative formulations put vulnerability in a context of the other phenomena that need to be assessed or measured:

(Hazard × Vulnerability × Exposure) / Resilience
= Risk [-> Impact -> Response]

Alternatively:

Hazard × (Vulnerability / Resilience)
[× Exposure] = Risk [-> Impact -> Response]

The choice of which conceptual equation to follow depends on whether or not one wishes to make exposure an optional component and whether one considers resilience to be the direct opposite of vulnerability (second equation) or the opposite of the whole assemblage of hazard, vulnerability, and exposure (first equation). In its own right, resilience embodies a combination of adaptation to hazard and the adoption of measures designed to resist impacts. Both elements can lead to the reduction of vulnerability, for example, by forbidding the construction of buildings in highly floodable areas (thus inducing human activities to adapt to the hazard) and building walls to contain high water levels.

As vulnerability is revealed in the impact of disasters, it can be given a simple tripartite classification. "Primary vulnerability" involves simple cause and effect. For example an earthquake demolishes a building that is vulnerable to seismic forces because it does not have sufficient resistance to dynamic acceleration of its foundations. "Secondary vulnerability" involves the interaction of causes, as when an earthquake causes a debris avalanche into a reservoir, which then leads to overtopping of the dam and downstream flooding. Finally, "complex vulnerability" results from more complicated interactions, as when parts of critical networks and infrastructure are rendered inoperable.

It was noted above that vulnerability is primarily the result of the social forces inherent in human decision making. In fact, total vulnerability is the sum of risk mitigation factors plus risk amplification factors mediated by risk perception, which can exert either a negative or a positive effect. Well-perceived and dreaded risks stimulate a demand for vulnerability reduction measures; underrated and ignored risks may lead to impacts that are worsened by neglect of such measures.

It was also noted above that vulnerability can be treated according to a series of categories. Another way to look at it is via the following classification of vulnerability types:

- *Total:* life is generally precarious. This is the primitive state in which society is not yet organized to deal with the threat of disaster.
- *Economic:* people lack adequate occupation. In disaster, livelihoods are a key element of vulnerability, as they represent a vital source of income for recovery.
- *Technological (or technocratic):* caused by the riskiness of technology. The proliferation of technology induces social and economic dependencies on systems that may be damaged or taken out of service by disasters.
- *Residual:* caused by lack of modernization. As vulnerability is a dynamic phenomenon, it evolves with society and hazards. Hence, it needs to be reduced by a constant process of adaptation to change.
- *Delinquent:* caused by corruption, negligence, and so forth. The predominance of unregulated special interests, such as organized crime, can lead to vulnerabilities that are high when the consensus in society is that they should have been reduced.
- *Newly generated:* caused by changes in circumstances. Emerging risks (e.g., new forms of pandemic disease) and changes in both hazard and exposure may raise vulnerability, and the societal response to it may lag behind because of inertia in collective perception and decision making.

In situations of complex vulnerability, several of these types may coexist, which is to be expected in areas threatened by multiple hazards.

The Context of Vulnerability to Disaster

Since 1970, the gap between rich and poor has widened continuously. As the world becomes more polarized and the prospects for social justice for marginalized people recede, so vulnerability increases among the poor and disadvantaged. This is part of a process of risk transfer that is consequent upon the globalization of commerce and the exploitation of labor. In the modern world, losses of capital in disaster have so far not been catastrophic enough to threaten the global system of production. Capital has proven highly flexible in the face of disaster risks. If labor has proven highly vulnerable, this has not greatly upset the leading decision makers.

Considerable uncertainty surrounds the question of "fat-tailed" distributions. These stem from the notion that hazard impacts are not regulated by a simple magnitude-frequency rule in which very large events are less of a threat because they are so improbable. Instead, high-magnitude disasters are viewed as more likely than Gaussian probability would predict, and vulnerability to them is of course very high.

Climate change scenarios tend to reinforce the "fat-tailed" distribution concept by implying that tomorrow's disasters may be orders of magnitude larger than yesterday's. Moreover, the concept of cascading disasters suggests that the bulk of the vulnerability may not reside in a simple cause-effect relationship but be present in the secondary effects. At the simplest level, it may not be the earthquake but the tsunami it causes that does the damage. In more complex cases, the loss of critical facilities may be the real disaster, irrespective of what causal agent was present at the outset.

Despite the bleak picture of steadily increasing vulnerability among the least influential elements of society, there is an alternative view of globalism. It is gaining ground in the light of the debate about sustainability. For disaster risk reduction (DRR), this has two elements: DRR must interact well with the need to create sustainable lifestyles and adequate stewardship of resources, and DRR must be sustainable in its own right. The misuse of resources is obviously a source of future vulnerability; meanwhile, a robust and resilient response to disasters must involve identifying, measuring, and reducing vulnerability in each of the categories outlined above. Hence, although it is a negative concept, vulnerability must be understood and faced up to if the more positive goals of a resilient, sustainable society are ever to be achieved.

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See Also: Climate Change Adaptation; Coping Capacity and Response Capability; Disaster Risk Reduction; Hazard, Definition of; Impact, Definition of; Interdependence; Risk Assessment.

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Vulnerable Populations

Vulnerability to crises is the result of several factors, including physical proximity to a risk, personal characteristics such as education, financial assets, constraints, physical issues, and choices made by an individual. It involves both environmental and social components such as risk, structural issues, gender, race, socioeconomic status, occupation, resources, social dependence, and social networks. Moreover, issues such as home location can also be related to crisis vulnerability. It is widely accepted that high-risk groups vulnerable to a crises include ethnic minorities, lower-income groups, the young and the elderly, people with disabilities, and female-headed households.

Therefore, the proportion of risk usually falls unevenly on different populations.

Vulnerability is, to an extent, the product of social and physical inequalities, the social factors that influence or shape the susceptibility of particular groups to harm, factors that impede their ability to respond, and the physical differences between persons. Past research supports the contention that racial minorities and economically disadvantaged persons are typically hit hardest by a crisis. For example, nonminority and people of higher socioeconomic status are usually better prepared for disasters and serious accidents than others. Minorities are at a disadvantage in terms of crisis preparedness because they are more likely to have lower incomes, have nonexpendable finances, and be unemployed They also have less access to transportation. The variability in crisis preparedness across ethnicity and socioeconomic status has been demonstrated in previous research. In an analysis of the locations with the highest death toll after Hurricane Katrina, findings suggest that the storm had the greatest impact on New Orleans' black community. The neighborhoods hit hardest were often either the poorest or the most segregated in the city.

Individuals with lower incomes, often socially segregated on the basis of race, age, and class, do not have resources to prepare for the onset of a crisis. Fully aware of their limited resources, these segregated populations tend to cling to and protect what they do have, causing them to be much less likely to evacuate their homes during times of crisis. Thus, when disaster strikes, these individuals often lose all possessions and must struggle to obtain basic necessities, especially shelter.

The most effective means of adequately preparing vulnerable populations for a crisis or disaster may be in messages that are disseminated well before the onset or threat of such an event. However, differences exist in terms of their reliance on specific media within vulnerable populations, as such populations tend to view media that are not local in format. Thus, practitioners should identify person or community networks to supplement the diffusion of emergency messages. Additionally, some research has noted that specific vulnerable populations are less likely to accept a risk or warning message as credible without confirmation of the message from others, specifically interpersonal or community networks, thus causing a delay in response time.

Disability

The elderly and disabled have increased vulnerabilities in a crisis. Populations that are physically or mentally disabled may be less able to respond quickly or to take proper protective action during crisis events and therefore more likely to experience harm. People living with disabilities have needs for particular services that may be unfamiliar to emergency workers or the general population. Therefore, a person with a disability may be less likely to survive a crisis because he or she is unwilling to go to emergency shelters or believes safety centers cannot provide for specific needs. Further, some individuals with disabilities receive aid from others via some formal or informal arrangement and may wish to wait before deciding to react to the crisis. Finding someone with whom to begin a new informal relationship may be difficult. Given the time pressures of a disaster, collaboration of that assistance may be difficult. With more people now living with disabilities of some kind than ever before, a need has emerged to more closely examine the needs of those with disabilities during crisis events.

Immigration

Throughout the crisis life cycle, immigration status causes a unique challenge. Many undocumented immigrants do not seek health care through traditional means because they are either unaware of that for which they are eligible or they are fearful because of their immigration status. Immigration status also raises the question of language, which will be a barrier in communication during a crisis. In the United States, crisis and emergency messages are often broadcast only in English, leaving many other groups needlessly vulnerable to the dangers. For example, nearly a third of New Orleans' Spanish-speaking residents spoke English at a low proficiency rate, raising the question about the need for bilingual communication of risks. With the exception of a few markets, major television stations provide only English programming; even in those markets that provide bilingual programming, stations are often unprepared for bilingual broadcasts of emergency messages. After Hurricane Katrina, Latino respondents were found to be lacking preparations and/or did not anticipate the potential strength of the storm and the implications of staying put or evacuating. If local media outlets are prepared to broadcast crisis messages in multiple languages and address the limitations of emergency response if the directions are not followed, it could reduce the harm and duration of the potential crisis and potentially reduce the burden on local medical facilities that also may not be prepared to meet such needs.

Children

Children represent a vulnerable group that often doesn't receive direct attention in crisis management. Children have physical vulnerabilities to both the crisis trigger events and long-term impacts of the crisis. Children represent a vulnerable group to crises, but at the same time children should be part of the crisis planning process and can actively participate in crisis preparedness. Many programs are implemented in schools and through the mass media that allow children to learn and practice crisis preparedness.

Children recover from traumatic events such as crises with time and various types of support, often without professional intervention. Although reactions to crises are time specific, there is a range of risk factors that can increase vulnerability to longer-term effects. In addition to physical vulnerabilities, children have emotional vulnerabilities to crises. They may develop emotional issues in the aftermath of crises that require short-term coping or long-term counseling. Additionally, they are at risk for behavioral issues in the aftermath of a crisis. Children who maintain an active and normal schedule and take action after a crisis have been found to be less likely to develop post-traumatic stress disorder (PTSD) symptoms.

Often the term *crisis resilience* is used to describe any attempt to reduce vulnerability in such populations. The goal of resilience is to help vulnerable populations engage in the process of preparing for, withstanding the onset of, and rapidly recovering from a crisis, often returning to a sense of normalcy described as a characteristic of the pre-crisis state.

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See Also: Blame, Politics of; Catholic Relief Services; Commodity Shortages; Cooperative for Assistance and Relief Everywhere (CARE); Coping Capacity and Response Capability; Evacuation; Immigration; Mass Media; Mental Illness; Poverty; Preparedness; Refugees and Forced Migration; Vulnerability.

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War Crimes

War crimes are committed during armed conflicts, whether international or internal, and this main aspect distinguishes war crimes from other crimes of aggression, or crimes against justice, or against the whole of humanity. Thereby, "war crimes" refers to the violation of the principle that requires soldiers to act humanely even though the mission of these soldiers is to kill the enemy soldiers. This thin line that separates the mercy and the compassion that soldiers need to show during war from the idea of war crimes committed by soldiers makes the international prosecution of such crimes a complicated process.

However, the most clearly defined war crimes would be those that violate a multilateral international treaty (e.g., The Hague and Geneva Conventions) that defines certain tactics that need to be applied by one state against another state during war. There have also been some customs that condemn certain tactics accepted as a kind of common law of war crimes. Thereby, such treaties and customs protect combatants when, for instance, they are prisoners of war, injured on the battlefield, and surrendered during battle. They also protect noncombatants against any deliberate or/and indiscriminate attack. Ancient world historian Herodotus refers to rules of war that were recognized by both the Persians and the Greeks. Similar values are included in the rules of chivalry that banned attacks against the wounded, the sick, women, and children.

The first case of an international trial for war crimes took place in 1474 in Germany, when Peter van Hagenback was convicted, sentenced to death, and executed for allowing his troops to rape, murder, and pillage. War crimes include assaults, including killings, of civilians, confined soldiers (e.g., soldiers who are held as prisoners of war), nonconfined soldiers (e.g., use of poisons that produce more suffering than is militarily necessary for winning battles), and property or the environment (e.g., destruction of monuments that is not necessary to win battles).

War Crimes and Humane Treatment

War crimes are considered crimes against humaneness rather than against humanity. *Humaneness* is a context-oriented term and refers, for instance, to the use of poison rather than bullets in battle. However, the view of humaneness as a context-based term varies across human history. For instance, the use of a catapult was once considered to be a war crime, but there is no such an issue nowadays. Furthermore, the definition of what is humane in the battlefield is related not only to the type of weapons used but also to the tactics applied by both sides. Thereby, raping of women of a town taken after a battle ended

Three psychosocial workers (left) with the International Rescue Committee (IRC) talk with IRC's gender-based violence program coordinator (right). The IRC helps rape survivors in South Kivu, Democratic Republic of the Congo (DRC), restore their physical and mental health. Since 1994, hundreds of thousands of women and girls in the DRC have been raped. Many are afraid to come forward and therefore suffer in silence. In 2008, the United Nations Security Council voted unanimously to classify rape as a weapon of war.

was thought to be normal in the past but is now strongly condemned. Therefore, the definition of what is humane that draws the boundaries of the rules of war and what counts as a war crime is mainly based on the development of new technologies of weapons and the acceptable tactics that change over the centuries.

Humaneness includes compassion and mercy in special circumstances of vulnerability of others. Such vulnerability may refer, for example, to a soldier who does not have a weapon at all when the enemy soldiers do. Thereby, the violation of humaneness in special circumstances, as described above, constitutes a war crime. For instance, U.S. soldiers leaving for Kuwait in 1990–91 were given a pocket card that summarized the rules of warfare. These written rules specified the soldiers' commitment to fight only combatants, attack only military targets, spare civilian persons and objects, and restrict destruction based on what the mission requires. Certain principles about the rules of war emanate from international treaties and customs. Thereby, the principle of minimal suffering refers to those acts that are necessary for winning the battle. Tactics and weapons are to be chosen in such a way that minimizes the suffering of the enemy. Moreover, the principle of discrimination mentions that soldiers should treat civilians differently from enemy soldiers. Also, the principle of proportionality points out that soldiers need to use an amount of force that is neither too strong nor too weak for the mission to be completed.

Terrorism

Terrorists are not normal soldiers; their attacks do not take place with the support of a state, and they seem not to conform to the principle of discrimination. The rules of war provide us with a foundation that makes soldiers feel pride and honor and distinguishes them from simple criminals. However, terrorists totally ignore the rules of war and the just war theory, which refers to the beginning of a morally justified war and the tactics of war that are morally justified.

Sexual Abuse as a War Crime

The wars in Croatia and Bosnia-Herzegovina became synonymous with rape. These atrocities made many people aware of rape as a common method of warfare and political oppression globally. Sexual abuse in these wars was directed primarily against women. Male prisoners were also sexually abused and humiliated by their captors. Also, detentions of raped women were deliberately prolonged in order to force impregnation of the victims of rape. However, the fact that some rapes were committed for the purpose of impregnating the victims initiated the position by some American feminists that these crimes should be classified as genocide. Moreover, there was a discussion among feminists on whether this crime should be labeled as a war crime. Many scholars currently believe that rape is frequently committed during an armed conflict and, hence, it should be explicitly, and not generally, identified as a war crime in international treaties.

Crisis Managers and War Crimes

Knowledge about the issues of war crimes will enable crisis managers to recognize critical situations that could be identified as war crimes. They will therefore be able to disseminate this knowledge about the atrocities of war crimes among others, such as politicians, government officials, professionals in nongovernmental organizations, students, and the general public. A better understanding of and involvement in the study of war crimes will promote discussions and continue to strengthen the Geneva Convention and other agreements intended to protect society from the horror of war crimes. Therefore, experts can advocate the formulation of an effective public policy on these vital issues in order to prevent the repetition of mistakes, guarantee the implementation of previously tested best practices, and prevent such crimes from happening again in the future. This way, crisis respondents and critical decision makers can develop necessary capabilities and expertise to develop a unified response action plan and manage complex operations in response to such crimes.

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See Also: Civil War; Religious Violence; Terrorism.

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Warm Site

A warm site is a designated standby recovery location where the organization can move its critical business processes and applications following a disruption to the site where they are normally hosted. It may or may not have the same capacity as the original site, depending on the organization's requirements. The site offers an agreed number of workstations and is partly equipped with hardware, data and voice communications interfaces, electricity, and environmental conditioning but can enable the organization to assume only essential operations and processes after additional provisioning of computers and other equipment, software, and the last backup of applications that will be shipped to it in the event of a primary site outage.

Warm site services are offered by vendors on an annual subscription fee that includes access to the site, the lease of equipment preconfigured to the organization's needs or, in the case that this is owned by the organization, rack space allocation. The fee varies with the service level agreement

(SLA), which may guarantee the site to be backed up and running in 12, 24, or even 48 hours and also includes a number of disaster recovery tests per year (usually two one-day tests). When the site is needed, the organization pays an additional "declaration fee"—this happens when preauthorized personnel declare a disaster or a severe outage that will trigger relocation to the site. Some recovery vendors apply the declaration fee against the first few days of recovery (in accordance with the SLA) and charge a daily use fee as long as the warm site is occupied.

The organization may also opt for "hot site" services where the vendor ensures immediate failover or mirroring capability and guarantees a fully operational and backed-up facility within four hours from declaration of severe outage or disaster. Personnel can report to the hot site instead of to the primary facility and can start working on their daily business functions in a suitable office environment with equipment that fully replicates their office operations. However, this "nearly instantaneous" failover of operations is a highly costly option that not many organizations are ready to opt for. The decision about the recovery strategy service level (cold, warm, or hot) will depend on the recovery time objectives (RTOs) and recovery point objectives (RPOs) set by the organization's Business Continuity Plan (BCP) and, of course, the budget available for alternate sites.

Warm sites are the choice that most organizations gravitate toward, as they are a reasonable compromise between cost and protection. As they already contain major equipment components, the elapsed time necessary to fully restore the organization's business processes is significantly reduced. Moreover, the annual tests included in the SLAs allow for better documentation and configuration of the required recovery assets and facilitate the effective personnel and equipment relocation as well as the efficient resumption (recovery time actuals [RTAs]) of critical business processes. With additional configuration pre-staged, carried out, and tested on-site, RTAs may be further reduced, depending on the scope of the recovery environment, the number of processes, and the amount of data to be restored. On the other hand, there is always the risk that travel time of personnel to the warm site and the time to ship extra equipment and load data from backup media may extend the recovery time beyond the RTOs determined in the BCP.

Warm sites may also be obtained on a shared facility basis. Organizations that choose this option make sure that their contracts include a "no lockout" clause that guarantees the use of an appropriately preconfigured facility even in periods of high demand.

An alternative to vendor-offered warm site services is a warm site provided through reciprocal agreement with a trusted partner organization that has a similarly configured site in a convenient location. By this agreement, the organization that is struck by a disaster or experiences an outage is allowed to use the partner organization's office space and equipment (normally during third shift) in order to perform prearranged and agreed operations. The agreements must be detailed because the hosting site might also have to run in degraded mode to some extent. Because this arrangement normally includes no maintenance costs (it may involve only prearranged fees to be paid upon activation by one of the partners), this is a low-cost alternative to a warm site recovery strategy that can provide speedy operation resumption, even if, at times, in degraded modes. Reciprocal agreements may also be tested in the same way that vendor warm site services are tested. It should be noted, however, that with changing requirements, equipment and operating software may not be compatible between both sites, and the reciprocal warm site agreement does not bind any party to keep up with the other. Information security may also be a concern in such an arrangement.

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See Also: Business Continuity Management; Business Continuity Planning; Business Continuity Planning Life Cycle; Business Resumption Planning; Cold Site.

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Warning

On Monday, May 3, 1999, 76 tornadoes occurred in seven hours across the states of Kansas, Oklahoma, and Texas. The largest was a rare and extremely violent twister rated at magnitude 5 on the Fujita scale, with wind rotation speeds of up to 500 kilometers per hour (km/hr) and a path that was 130 km long and averaged 1.5 km wide. Damage exceeded $500 million, and 4,319 buildings were destroyed. However, good monitoring and public communication processes were in place, which allowed warning times that varied between 20 and 120 minutes. This was ample time to take cover. As a result, there were only 44 deaths, a significant number but far fewer than would have been the case if there had been no warning.

A warning is a recommendation or order for action to take place on the basis of a prediction or forecast. Predictions should be made by scientists or other qualified experts, whereas warnings should be the responsibility of public administrators, usually at the regional or local authority level. Emergency management agencies are typically responsible for warning the public about impending hazards. Hence, the warning process has three subsystems: technical, administrative, and social (Figure 1). Absence of efficiency of any of these subsystems will render the whole warning process ineffective.

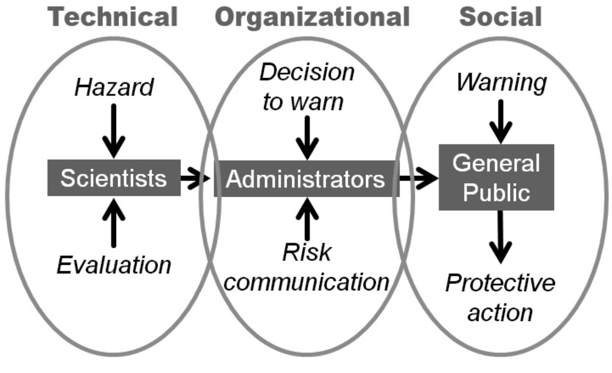

Figure 1 The three subsystems of the warning process

On the Effectiveness of Warnings

Various factors influence the effectiveness of warnings. The first is the predictability of the hazard.

Imprecise Predictions

The problem of imprecise predictions is compounded by other factors that influence the effectiveness of warnings. Precise prediction is difficult or impossible if there are no precursors, or if these are unclear or indeterminate. Likewise, the speed of onset will determine the window of time available to assess the situation and issue a warning. The frequency, duration, and size of the impact are also relevant factors, as is the degree to which it can be limited or controlled by timely action. Nevertheless, a clear situation of identifiable precursors that have a known sequence and predictable timing would provide a good basis for launching the warning process. Floods, snow avalanches, hurricanes, and storms often show promise in this respect. Despite a long, drawn-out search for reliable precursors, earthquakes are largely unpredictable in the short term (although general seismicity is known and predicted). Through enhanced heat flux and surface deformation, volcanoes offer a good basis for predicting that an eruption is imminent, but it remains difficult to pin down the exact timing of its onset or how long it will last.

Anatomy of a Warning System

In synthesis, a warning system should consist of technical and social components, monitoring and evaluation procedures, technology and organization, planning, and communication. The absence of any of these ingredients is likely to compromise the effectiveness of the whole system.

There are several stages in the implementation of the warning process. To begin with, decision makers who are responsible for public safety must recognize that a warning is needed and that it is feasible. They must then decide whom to warn, about what, and by what means. A system must be designed, installed, and tested. It must be able to receive reliable information from the monitoring of a hazard with sufficient time to convert it into a warning message and disseminate this to users; for example, the general public in a given area, or a specific subset of the public, such as disabled people. A warning message should state the following:

- What is likely to happen, that is, the nature of the impact
- When it is likely to happen, that is, the time window of the prediction
- Where it is likely to happen, that is, the geographical area affected
- What the consequences of the impact are expected to be
- What actions are required and whether the response is obligatory or merely recommended
- Whom to contact for further information

Before the system is used and a warning is disseminated, the recipients (e.g., the general public) must be educated to understand the message and respond to it appropriately. Use of the system in a either test or in a real emergency will provide the opportunity to evaluate it and design modifications that will improve its performance. It should be borne in mind that a warning system should be dynamic, in that it will have to respond constantly to changes in the hazard that is being monitored, as well as changes in the responses manifested by the people who are being warned.

An additional factor is that warnings can be distinguished by phase. The primary division is between a hazard "watch" and a hazard "warning." The watch may state that "conditions have occurred that normally precede a disaster." This allows for the possibility that they may abate rather than increase, leading to the emission of an "all clear" message. It also reduces the chance of a false alarm. The warning will be issued at a later point in time, when the threat has grown to the extent that an impact is either certain or highly likely. More sophisticated distinctions also allow for an alarm phase, at which forces are required to attain a state of readiness and pre-mobilization.

Besides the distinction between the "watch" and the "warning," more than one message is usually needed. Moreover, the warning message must be adapted to changing circumstances, including variations in the way beneficiaries perceive it, as manifest in the actions that they take. When communicating with the public, a basic choice must be made regarding the means of delivering the warning. Television and radio are useful if a sufficient proportion of the beneficiaries is tuned in (i.e., not in the middle of the night and possibly not during working hours).

Loudspeakers on vehicles have potential for neighborhood warnings; so do sirens, except that they send a nonspecific and hence potentially ambiguous message. Telephone chains can ensure that individual householders are contacted, but they are time-consuming, even when automated contact and message systems are used. Finally, considerable potential is offered by bulk Short Message Service (SMS) text messages delivered to mobile telephones, and various automated warning systems of this kind are being developed. However, there is still no warning mechanism that fits all circumstances equally well. Hence, it

Case Studies: Earthquake Warnings

Three examples of earthquake warnings issued to local governments by the U.S. Geological Survey (USGS) in California serve to illustrate the difficulty of providing warnings against hazards where the state of precursors is poorly known and understood. In the first case, the USGS warned that there was an 86 percent chance that a magnitude 7 earthquake would occur in southern California during a 25-year period. This would provide justification for retrofitting buildings but, of course, would offer no basis for immediate protective action. Second, the USGS warned that there was a 5 percent chance that a magnitude 5.1 earthquake would occur in the San Francisco Bay region during a series of specified five-day periods. Here, the window of time was much sharper, but the probability of an event was too low to stimulate much action. Moreover, other than being vigilant, little could be done to be ready for the earthquakes should they occur. The same was true of the USGS's warning of a 20 percent probability that an earthquake of magnitude 5.1 or greater would take place in a restricted area of southern California during a given 30-day period.

may be best to use a variety of delivery systems, allowing for adaptation of the message to the means by which it is delivered.

Once a warning message has been sent, it must be received, evaluated, and acted upon. Rates of both reception and compliance need to be monitored. The effectiveness of a warning depends on several factors. As noted above, the first is the physical opportunity to predict a threatening phenomenon accurately and deliver a warning message. Second, the probable consequences of the impact are important. People tend to overestimate potentially spectacular hazards and underestimate those that appear less threatening. Generally, warning messages that succeed emanate from official sources and are clear, consistent, precise, repeated, and confirmable.

How People React to Warnings

The subject of how people react to warnings is rather complex. Given an order to take action—for example, to evacuate—there will be a continuum of reactions. Some people will follow orders with alacrity, others after a period of evaluation or inactivity. Some will devote most of their energy to attempts to confirm the warning, while others may receive it and do nothing. The worst case is that of people who totally deny the threat and thus take no action. However, with respect to behavior such as evacuation, the deniers may eventually take action merely not to be seen as different by the rest of the community. Nevertheless, warnings seldom, if ever, elicit 100 percent compliance, and they are usually impossible to enforce by policing actions, such as arresting people accused of doing the wrong thing. Hence, there will always be a continuum between adaptive and maladaptive behavior in response to warnings.

People tend to react to warning messages differently according to circumstances; for example, a tornado warning is difficult to believe if the sky remains blue. Also significant are personality factors, individual experience, and social context. Confirmation behavior may be very important, and it tends to begin in the family with a process of socialization that may extend to colleagues and friends. Confirmation is inherent in warnings issued by people who are known authorities, such as a chief of police. In any case, people will contact the authorities for confirmation after they have socialized their response to a warning, and thus a warning system should include ample mechanisms to provide confirmation, for example, through a telephone call center. Regardless of this, the first reaction to warnings tends to be disbelief and "normalcy bias," the tendency to believe whatever is the most comforting explanation of the prevailing situation. This is followed by "latent confirmation," in which the person who receives the warning asks himself or herself whether it accords with his or her system of beliefs, personal knowledge, and life experiences. Panic is an unlikely response to warning, and there may instead be "unconflicted inertia," the tendency to undervalue the warning. Sometimes this stems from "cognitive dissonance," the tendency to believe two things that are not reconcilable; for example, "there is a seismic hazard but although I live in the area affected, I am not at risk of earthquakes." Finally, there may be some deviant behavior. In the past, tsunami warnings in both Hawaii and California have induced people (especially young males) to ignore instructions to evacuate to high ground and to make for the shore "to see the waves come in." This has led to deaths by drowning.

In contrast, sociologists have been able to construct a profile of people who react best to warnings. The archetypal "good respondent" is female, is between the ages of 25 and 40, is not a member of an ethnic or other minority group, is well integrated into the local community and its institutions (but possibly has not lived there throughout her life), has a good education and middle or high social status, is a parent with children living at home, lives near relatives and utilizes kinship networks for support, and is well able to understand the risk.

The Warning Process in Practice

One important aspect of warnings concerns the false alarm. The U.S. Geological Survey installed some 300 monitoring instruments on a locked part of the San Andreas fault at Parkfield, California. In 1993–94, the USGS made it known that there was a 90 percent chance of a magnitude 6 or greater earthquake during an 18-month period. Interest in Parkfield soared, but after 18 months, there had been no earthquake. A subsequent inquiry made it known that the USGS was not at fault, and the warning was justified, despite the fact that the 10 percent odds had prevailed. Sociological research is equivocal about false alarms, which have mostly been studied in the context of the erratic behavior of hurricanes that were predicted to make landfall and either did not do so or missed the communities they were predicted to strike. A proportion of respondents lost faith in the warnings, while others recognized their probabilistic nature and benefited from being sensitized to the hazard and to mitigation procedures.

Finally, one great failure of the warning process underlines the importance of the connection between its technical, administrative, and social subsystems. On the night of November 13, 1985, the Colombian volcano Nevado del Ruíz produced a phreatic eruption that sent lahars (volcanic mudflows) coursing into towns and villages on its flanks, notably the town of Armero. Some 23,000 people died. Why had they not been warned? The volcano was heavily monitored with scientific instruments. A hazard map, which proved substantially accurate, was newly drafted and had been shown to local residents. However, there was a failure of communication between the volcanologists, civil protection authorities, and the public. Either there was no evacuation, or it was ordered too late to be of use.

In part, this reflected the division of responsibilities between Bogotá and Armero. In part, it had to do with the unpredictability of volcanic eruptions, especially at night in the absence of good visual information. Above all, there was a failure to appreciate the need for timely communication. A great opportunity to save people by warning them was thus lost.

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See Also: Agency Notification and Mobilization; Crisis Communications; Early Warning Systems; Evacuation; U.S. Geological Survey (USGS).

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Weapons Trafficking

Weapons trafficking, the illegal smuggling of contraband weapons, can exacerbate political turmoil in regions facing instability. Weapons trafficking can include the movement of small arms, light weapons, ammunition, and explosives. Although weapons trafficking has taken place for centuries, over the past two decades international agencies and authorities have moved to curtail such movement because it causes political and economic volatility. Weapons trafficking is related to but different from commerce in firearms, which, although at times controversial, is in compliance with local and national laws.

Background

Weapons trafficking is a concise but narrow term. Though historically, weapons trafficking has concentrated upon illicit transfers of ammunition, arms, and associated materials, it has expanded in recent decades to include acquisition, manufacture, possession, storage, and use of such weapons and materials. The process of weapons trafficking is somewhat hard to understand because of the multiplicity of forms that it can take. Weapons trafficking is driven by demand from a variety of clients, including armed participants in wars, bandits and insurgents, criminals and criminal organizations, embargoed governments, and individuals who desire firearms but who are prohibited from owning them by local laws and regulations. Although some weapons that are transferred illicitly are manufactured especially for this purpose, many others are procured from a variety of sources, including arms captured in battle, gun owners, legitimate manufacturers, and military arsenals.

The types of transactions that comprise weapons trafficking also vary greatly. The majority of weapons trafficking transactions are small transactions by individuals or firms that knowingly fail to comply with regulations and laws related to arms transfers, such as when guns are sold to forbidden recipients. Larger transfers of weapons, often involving high-value shipments delivered to out-of-the-way locations, are conducted by dishonest brokers or middlemen who utilize established networks and channels that are also employed for smuggling other illicit goods, such as narcotics or counterfeit products. Finally, governments themselves sometimes deal in covert weapon sales, both by ignoring the first two types of transactions and by deals arranged directly through government agencies. The types of weapons sold also vary significantly. Many weapons involved in illicit transfers are firearms and light weapons, which are easily transportable and fairly easy to conceal. Firearms and light weapons have a relatively low cash value and can be transported by individuals or smuggled in legitimate shipments of other goods. Once delivered, firearms and light weapons are easily maintained and operated by the end purchaser and are appropriate for a variety of unlawful uses. In contrast, major weapons, such as missiles, tanks, and aircraft, have a high cash value, are difficult to transport, and are much more closely watched by government entities.

Precisely which weapons transfers can be deemed "illicit" is open to some debate. During much of the Cold War, the United States, the Soviet Union, and their allies asserted that supplying arms to nonstate rebel groups (also known as "freedom fighters") was a legitimate activity. Although nations facing insurgencies and their allies maintained this behavior was illegal, enough uncertainty existed that neither side protested as vigorously as it might have done. After the end of the Cold War, these feelings changed, and by the mid-1990s, a variety of opinions converged to better define illicit transactions. In 1996, for example, the United Nations (UN) Disarmament Commission defined "illicit arms trafficking" as any international arms trade that is in contravention of state or international laws. Although certain practices are still contested, a growing consensus regarding weapons trafficking has led to growing international cooperation in an attempt to defuse crises springing from such activity.

Initiatives

There has been a growing recognition that international crime and corruption fuels illicit weapons trafficking. As a result, initiatives designed to hinder or halt unlawful weapons trafficking have increasingly sought to develop comprehensive responses to the underlying conditions causing instability that creates a market for illicit arms. Additionally, individual nations have seen the value of cooperating with other states in efforts to combat arms shipments, investigate criminal uses of weapons, and prevent the flow of arms to areas of conflict. Responses to combat weapons trafficking have occurred on the national, regional, and international fronts.

During the late 1990s, the United States began supporting an initiative known as Plan Colombia, which was a multifaceted campaign to reduce narcotics and weapons trafficking in that South American nation. Plan Colombia combined drug interdiction, support for economic development, military assistance, eradication of drug crops, and a crackdown on weapons trafficking in an effort to reduce the underlying conditions causing instability in the region. Part of the United States' war on drugs, Plan Colombia was endorsed by the administrations of Bill Clinton and George W. Bush. Despite this, Plan Colombia was criticized by some as being ineffective and as more focused on providing support to the Colombian government than on combating narcotics or weapons trafficking. Regional initiatives to combat weapons trafficking also became more common beginning in the 1990s, such as the initiative of the Organization of African Unity (OAU) to reduce illicit arms trade in sub-Saharan Africa. Individual African governments coordinated their anti–weapons trafficking initiatives through the OAU, and this led to a reduction in the amount of light arms available. On the international level, the UN ratified a firearms protocol in 2005 that was designed to regulate the manufacturing and trafficking of small arms in an effort to curtail illicit arms transfers. Focusing as it does on handguns, light missiles, machine guns, and pistols, the UN firearms protocol provides the first international attempt to regulate the production and spread of firearms. Those nations that ratify the protocol agree to initiate a series of crime control measures and to criminalize the illicit manufacture or sale of firearms. To date, over 100 nations have ratified the UN firearms protocol, including Canada and the European Union. The United States, however, has not ratified the agreement.

Conclusion

Weapons trafficking is important to the crisis manager because such behavior can jeopardize or make vulnerable the best of crisis management plans. Only by anticipating the unexpected and understanding that illegal and illicit arms trafficking may provide wrongdoers with otherwise unforeseen weapons can the crisis manager fully prepare to meet this challenge. Skillful crisis managers keep informed about otherwise irrelevant illegal behavior that might affect their operations.

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See Also: Agency Notification and Mobilization; Arms Control; Civil War; Hijackings; Human Trafficking; Interstate War; Revolution.

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Whistle Blowers

Crises and whistle blowers have some noticeable commonalities. The former are extraordinary situations, and the latter are extraordinary people. Same poles of magnets repulse each other. The same seems to hold true for whistle blowers and crises. That is, if there are whistle blowers in an organization, crises are less likely to happen, or if there is crisis resulting from corrupt, illegal, or unethical behavior, this might probably be because of a lack of whistle blowers in that environment.

Therefore, whistle blowers may play significant roles before, during, and after crises. If there are active whistle blowers in an organization, the "before" stage of a crisis may be less likely to turn into an actual crisis, as whistle blowers may prevent it from happening by intervening at earlier points. If a crisis occurs and there are dedicated whistle blowers around, the directions and dimensions of the crisis may noticeably change, primarily because those who cause the crisis by a chain of misdeeds may attempt to cover and manipulate the underlying facts and factors during crisis. Whistle blowers stand up at great personal expense during such times to expose an organization's dirt. Finally, in the aftermath of a crisis, whistle blowers may enable a fast—and possibly the best—recovery, shedding light on what actually happened and why. If this is the case, similar mistakes are unlikely to be repeated.

What Is a Whistle Blower?

Even though there is no standard definition, a whistle blower is essentially one who exposes illegal, unethical, or wrong behaviors to internal or external authorities to end such behaviors and/or get losses recovered for the common good, often acting at significant risk to themselves and their families.

Daniel P. Westman categorizes whistle blowers into three groups: passive, active, and embryonic. Passive whistle blowers are generally those who come forward and provide information to authorities about illegitimate activities upon official request. Active whistle blowers reveal coworker misconduct in or outside organizations. Embryonic whistle blowers are terminated before they expose illegitimate activities. There is another categorization, as internal and external whistle blowers, depending on whether they voice the illegitimate activities within the organization or report them to outside authorities or the government. Marcia P. Miceli and Janet P. Near found that whistle blowers are more likely to hold higher professional status than others who keep silent. Depending on the professional status, the support whistle-blowers receive out of the organization is more likely to increase. On the other hand, they have more chances of reemployment after getting fired. Some of the famous whistle blowers who made history are W. Mark Felt (also known as Deep Throat), Daniel Elsberg, Frank Serpico, Peter Buxtun, Bradley Manning, Coleen Rowley, Mark Hodler, Cheryl Eckard, and Sherron S. Watkins.

Brief History and Rise of Whistle Blowing

A series of events, more notably after the 1960s, resulted in a gradual evolution of whistle blowing, as discussed by Martinella M. Dryburgh. Legal regulations in favor of consumers to protect them against poor quality or unsafe products served as an initial step igniting the idea and practice of whistle blowing. This was followed by a generation of student activists who entered the workplace as responsible employees during the 1970s. This generation made the atmosphere more conducive for people to stand up against unfair practices in the workplace. Other legal regulations requiring ethics training for federal employees seem to have contributed to development of whistle blowing within government. Developments in communication technologies and the unavoidable interest of mass media in whistle blowing cases provided a new dimension to the concept and practice of whistle blowing. Today, millions all over the world can become aware of almost every single detail of a case instantly, and nothing is a secret once the whistle is blown.

Obstacles and Costs

The first distress that whistle blowers face is the issue of loyalty. Whistle blowers voice wrongdoings in their own organizations from which they receive paychecks. For this reason, they are first rejected and isolated by management and fellow workers under the guise of being disloyal. Fear of retaliation is evidently a major concern for whistle blowers.

Whistle blowers may also face legal troubles because external whistle blowing may be against their employment contract, resulting in termination and even lawsuits. Such probabilities leave some whistle blowers in a state of limbo.

There are studies clearly indicating existence of a correlation between ethics and whistle blowing. Accordingly, whistle blowers are known to be people of high character. However, this often comes with a price to whistle blowers. Their negative experience varies in a wide range of costly reactions in their professional and personal lives. Rejection and isolation by fellow workers, discrimination, mobbing and harassment within the organization, loss of job (getting fired), ostracism, and other forms of retaliation are what usually follow a whistle blower. These negative experiences inevitably reflect on one's personal life. It is not unusual for whistle blowers to become depressed, lose their financial assets and friends, get divorced, and suffer detrimental health effects.

Nevertheless, doing the right thing sometimes may be unexpectedly rewarding. When Cheryl Eckard took the risk to expose a serious problem at GlaxoSmithKline, a worldwide pharmaceutical company, she did not even imagine that the company would be fined for $750 million and she would receive $96 million after undergoing a very difficult time, Peter Stiff reported. Richard Caruso blew a whistle with his colleague Steve Rigg on corruption in Corcoran State Prison in California. He has experienced a series of serious troubles in the workplace after blowing the whistle. He filed a lawsuit claiming that the Department of Corrections failed to protect him against retaliation and ultimately received $1.7 million in compensation, as Martinella M. Dryburgh pointed out.

Relationship With Crisis Management

Both in government and in business, depending on the seriousness, crises give birth to reforms. During 2004, the United Nations (UN) faced what is known as the oil-for-food scandal. Other problems, such as organizational inefficiency, corruption, and poor management, have also been voiced to the UN. General Christopher Burnham, who was hired by the UN to oversee reforms, named the scandal a reputational crisis. He pointed out the need for reform in the UN, indicating an efficient whistle blowing policy to be a major element, as reported by Nick Wadhams.

Policy Implications

With several renowned examples, the impact of whistle blowers on organizational functioning has become apparent both in industry and in government. Therefore, it is imperative that strong whistle-blower mechanisms be included in official and operative policies of organizations. Along with written policies, whistle blowers should be encouraged by creating a transparent work environment conducive to voicing misconduct. Depending on the environment of each organization, there might be several ways to ensure this.

Professional ethics training for employees can be recommended as an initial step. Research findings indicate a strong correlation between such training programs and reporting wrongful actions in organizations, as pointed out by Dave Slovin. Such training would provide a basis to raise awareness and set ethical standards, with mutual involvement of employees and management. Eradicating gray areas where unethical behavior is likely to be nurtured by enhancing transparency would provide a significant contribution. Thus, nobody would have an excuse to cover up wrongdoing, because everybody gets together to stand up against it. Gary R. Rothwell and Norman J. Baldwin point out that employees of certain government agencies are more likely to report misconduct, partly because of ethics training programs.

As mentioned above, one of the major concerns whistle blowers have is the fear of retaliation. In order to ease their concerns, an efficient legal framework is needed to protect them against different forms of retaliation. The legal regulations on whistle blowing date back to as early as 1863. The oldest handy legal tool regarding whistle blowers is the False Claims Act. It is often called the Lincoln Law because it was passed during Abraham Lincoln's presidency. The act was originally passed to prevent contractors from deceiving the government by selling unfit mules and horses and defective military equipment during the American Civil War. It stipulates that a person who reveals a misconduct on behalf of the government and helps recover any losses will receive 15 to 25 percent of recovered losses. Today, whistle blowers still enjoy the benefits offered by this law. Another major legal tool is the Whistleblower Protection Act of 1989 (WPA).

The WPA protects federal employees who come forward to expose agency misconduct. The WPA provides protection for federal agency workers against any form of retaliation. The 2002 Sarbanes-Oxley Act sets another good example of legal protection shielding whistle blowers, provided that their actions fall into what the act prescribes as protected activity. Legal frameworks may fall behind contemporary needs as society changes; therefore, they should be updated, revised, or reenacted in accordance with social changes and changing needs.

Another step would be building more convenient working channels for whistle blowers to act. Technology should be utilized as much as possible. Providing anonymous means of communications, such as Web sites, short message services, or hotlines, may prove adequate. Telephone hotlines turn out to be considerably more efficient in detecting and deterring misconduct. For example, as interestingly pointed out by Slovin, fraud losses are reported to decrease nearly 60 percent when hotlines exist to report fraud. Also, one of every five Americans has personal knowledge of fraud in their workplace. Nearly 40 percent of them are willing to step forward and reveal what they know if they are sure their identities will be kept anonymous. Nearly 60 percent of possible whistle blowers indicate they would prefer a telephone hotline over a traditional letter or Web site.

Crises happen often as a result of a chain of illegal activities or misconduct that damages public interest or causes extensive harm to others. Whistle blowers are those who stand up and try to stop such unjustifiable actions while risking themselves. There are several whistle blowers who have changed the course of events, people, and policies at large organizations. Whistle blowers should be considered major figures in the context of crisis management. After traffic accidents, taking immediate on-site safety measures and opening jammed traffic to prevent subsequent accidents, carrying the injured to hospitals as soon as possible, providing them with health services, and getting damaged vehicles repaired are necessary and valuable actions.

However, all these necessarily fall into a set of "reactive" measures. What is important and even more valuable is to take proper precautions to prevent accidents before they happen. Whistle blowers are people of high character who come forward to try to prevent large-scale social accidents before they happen. Unfortunately, there is not a "crisis meter" to gauge how many crises have been prevented because a whistle had been blown. The numbers of potential crises prevented by whistle blowers are unknown. Similarly, whistle blowers may play an important role during and after crises by revealing underlying facts from within. This provides for faster recovery after crises and contributes to reducing repetition of similar mistakes in other organizations. Maybe the best crisis management is to manage to prevent crises before they come about, and such a low-cost management tool would be by means of active whistle blowers. This can also be called "proactive" crisis management.

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See Also: Disaster Risk Reduction; Incident Management; Network for Good; News Media; Organizational Failure; Policy Setting; Political and Organizational Leadership; Pre-Crisis Training and Planning; Prevention; Public Awareness and Education; Public Image; Recovery; Reputational Risk; Risk; Risk Analysis; Risk Assessment; Risk Society; Risk Treatment; Scapegoating; Situational Analysis; Social Media; Strategic Plans; Strengths, Weaknesses, Opportunities, and Threats; Training; Trigger Events; Warning.

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Wildfire

Forest and rangeland fires (wildfires) are sources of important ecological and economic damage, as well as serious risks to human lives and settlements. A wildfire is an environmental conflagration that burns out of control and threatens people, buildings, or resources. In Australia, where wildfires are a particularly important natural hazard, they are known as bushfires. About 40 percent of Australia is susceptible to bushfire hazards (i.e., it has enough combustible vegetation), which are a particularly strong risk at the urban-wildland interface. Although it is the hottest part of Australia, the desert at the heart of the continent is not at risk; rather, it is the vegetation in less arid areas, especially those that are settled.

Wildfire is a natural phenomenon that has always existed where dry vegetation is present. The causes of wildfires can be divided into natural and anthropogenic. Lightning strikes are a natural cause whose importance varies from place to place with meteorological and vegetational conditions. Human negligence and vandalism have come to be dominant causes, especially at the urban-rural interface. It is thought that vegetative fermentation leading to spontaneous combustion may cause fires, but the evidence for this is extremely scarce. The frequency of wildfires in the past can be calculated by assessing damage to the xylem (wood) of trees and dating it by counting the annual rings, a process known as dendrochronology. Indications may also be present in the sedimentary record, as fires are often followed by episodes of accelerated erosion and deposition.

The essential ingredients of a wildfire are combustible material (fuel), heat, and oxygen. The dimensions, duration, and intensity of wildfires vary according to several group factors. The first of these includes the type, flammability, and water content of combustible material (Table 1). Together, these represent the fuel loading factor. Second are meteorological conditions, in particular temperature, ambient humidity, and the speed, direction, and variability of winds. Finally, the topography and ground slope in the local area interact with the other factors to exert some control on rates and directions of burning. In fact, a wildfire can climb a slope, propelled by convection of wind and radiation of heat.

In geographical terms, fires tend to spread in a nonlinear manner. Large expansions in area occur during the early phases as abundant fuel is consumed, and asymptotically smaller expansions are characteristic of later periods as fuel is consumed or the fire is brought under control. Owing to their demand for oxygen, large fires create their own drafts, which can lead to fire-induced convection and a positive feedback situation in which the fire creates substantial winds, effectively a firestorm.

There are various classifications of wildfires. The simplest and most common has six categories. A “ground fire” involves combustion without flames in the roots and undergrowth. A “surface fire” may occur in rangelands, bushes, and plant litter. In a “dependent crown fire,” the crowns of trees catch fire but the fire is propagated in the undergrowth. In contrast, a “running crown fire” propagates the flames rapidly through the tree crowns. This may lob burning brands ahead on the wind and thus cause a localized, concentrated “spot fire.” Finally, if the wind changes direction and the combustible material has not been completely consumed, the result may be a “backfire.”

It is also possible to classify the phases of wildfire. At the beginning, it may be out of control. Thereafter, a “confined fire” is limited to a predetermined area using natural and human-made barriers. After considerable intervention by firefighters, a “contained fire” is surrounded by a control

Table 1 Characteristics of fuels in relation to wildfire occurrence

Typical values	Grass	Brush	Slash	Timber
Fuel loading (tons/hectares)	2.6–12.9	50–100	80–500	260–1,500
Fuel availability (percent)	100	5–95	10–70	5–25
Ground fuels	Leaves, grass and limb-wood, duff, roots			
Surface fuels	Low vegetation, large logs, leaves, grass and limb-wood			
Aerial fuels	Tree trunks, branches, moss and snags			

line so that it cannot spread further. Finally, once it is under control, the fire is completely encircled by the "control line" and burns in predictable ways.

Wildfires have both beneficial and destructive effects on the natural environment. Regarding vegetation, they can stimulate the growth of rangelands and meadows, as well as the flowering of bushes and plants. They can encourage the germination of seeds, but they may restrict the growth of woody plants. With respect to the soil, they can purify it by destroying toxins, fungi, and parasites, but on the other hand, they may cause accelerated erosion. Although wild animals can generally cope well with natural fire, birds may find their nests destroyed and their habitats fragmented. Nevertheless, ecological environments created or maintained by wildfire show the greatest diversity of species.

Particular fire risks apply to the Mediterranean *maquis* or *macchia* vegetation (known as "chaparral" in California), which is highly flammable. Mediterranean vegetation can give rise to very hot fires (540–1,100 degrees C), fed by dry bushes that are full of highly flammable oils. The same is true of the eucalyptus species that are common in Australia. The elimination of Mediterranean vegetation by wildfire can impermeabilize surfaces by depositing natural polymers (hydrophobic residues), which increase flood potential. This in turn leads to surface slides of dry ravel and, in conditions of saturation, serious mudflow and debris-flow hazards. Hence, wildfires in Mediterranean environments contribute to accelerated erosion and the formation of gullies.

There is no doubt that human activity has increased the frequency of wildfires in inhabited areas. A "controlled fire," the deliberate setting of small fires, can reduce fuel loading levels, but it remains controversial and can cause damage if the fire gets out of control. On the other hand, the

Fire crews set backburn fire to stop the Poomacha fire in San Diego from advancing westward, October 26, 2007. In one of the worst U.S. wildfire seasons on record, nearly 1,000 firefighters fought the 16 wildfires that roared in 50- to 60-mph winds and burned nearly 500,000 acres from the Simi Valley to the Mexican border. Ten people died as a direct result of the fires, and 85 others were injured, including at least 61 firefighters. Over 321,000 people evacuated their homes, 2,233 of which were destroyed.

total elimination of wildfires allows massive accumulations of flammable material and therefore leads to much bigger and hotter fires that spread more rapidly. Hence, fire suppression is widespread in areas of high hazard. This can involve lookout towers and field patrols as well as aerial surveillance. It can also involve infrared monitoring from the ground, the air, and satellites.

In order to fight a wildfire once it has broken out, crews need to reduce the supply of heat, oxygen, or fuel to the fire. Fires are dangerous and sometimes unpredictable phenomena, so it is important that firefighters are fully trained personnel. Parachute brigades can be used in areas that are difficult to reach, but care must be taken to ensure that they do not become encircled by the fire. Corridors of low fuel loading can be constructed either before fires occur or at the time in order to contain them.

Water or flame-retardant chemicals can be dumped on the fire from aircraft. For example, Bell-412 helicopters can transport 1,400 liters of water, which can be brought up from lakes. The Erickson Air Crane has a larger capacity. C-130 transport airplanes can carry 11,000 liters of flame-retardant chemicals, and Canadair CL-215 Super Scooper aircraft are able to descend upon a lake and take up 6,000 liters of water in 12 seconds.

Information management and command and control systems are important to fire fighting, especially when large or numerous fires need to be tackled. California Firescope is a model system that was inaugurated in 1970. It was the basis of the development of the incident command system (ICS) and currently offers a multiagency coordinating system (MACS) that coordinates the fieldwork of 28 agencies through an operations coordination center (OCC). This ensures that the tactical approach to fire fighting is rational and efficient. California Firescope also includes an information system and data bank, which covers weather forecasting, infrared surveillance of areas at high risk of fire, immediate reports on the state of fires and status of suppression activities, and advice on the best tactics to adopt for fighting particular fires.

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See Also: Avalanches and Landslides; Crisis Information Management Systems; Fires.

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Worker Error

Webster's online dictionary defines an error as "an act or condition of ignorant or imprudent deviation from a code of behavior" and also "an act involving an unintentional deviation from truth or accuracy." There are different possibilities and proneness to errors in the workplace by workers. Workers, like all human beings, are all prone to errors. Worker errors are responsible for various accidents in the workplace, failures, and product or service defects. About 96 percent of the errors that occur in the workplace are attributed to worker error or human error. Human error can be described as an inappropriate human act, decision, or behavior that causes or has the potential to cause undesirable events like accidents, poor system performance, system failures, product/service defects, or reputational crisis.

Several factors affect workers' proneness to error in the workplace. They include the environment, equipment design, organization, procedures, competence, and training. Worker error is responsible for many of the disasters that occur in the workplace. It has been fingered as the main cause or contributory factor in a majority of catastrophic historic events, including the *Exxon Valdez* accident, Bhopal chemical plant disaster, Pier Alpha, Chernobyl nuclear plant disaster, and even more recently, the Fukushima nuclear plant disaster triggered by the earthquake and tsunami but made worse by worker error. Many accident and incident reports cite human error as the primary cause. It is estimated that in the United States, worker errors are responsible for 70 percent of airplane accidents and 60 percent of nuclear plant accidents. It is also estimated that in the intensive care units of hospitals, doctor/nurse errors occur at a rate of about 1.7 per patient daily.

Worker errors can be classified as errors of commission or errors of omission. In errors of commission, the worker takes an inappropriate action that results in an unintended outcome; for example, an operator performs a step incorrectly or performs an extra step that is incorrect. In errors of omission, worker inaction results or contributes to deviation from an intended outcome; for example, an operator fails to perform a procedural step. There are three types of errors committed by humans: mistakes, lapses, and slips. They are directly related to the three stages of cognition: planning, storage, and execution. Mistakes happen when workers follow the steps in the plan but the outcomes achieved are unintended, mainly because of the original plan being wrong. Lapses are the result of memory loss or forgetfulness; they are not observable events. Slips are observable events not in accordance with the original plan. They are associated with the execution stage of cognition.

There are three levels of cognitive task processing, namely skill based, rule based, and knowledge based. Errors occur at each of these levels of human behaviors.

Skill-based error: This includes slips and lapses. It occurs usually due to misplaced attention or inattention, mainly the result of the worker becoming accustomed to what they do. The majority of the errors committed by workers in the workplace are a result of this type of error.

Rule-based error: This type of mistake is often a result of using an inappropriate rule. Workers in an organization are governed by policies and procedures. A worker can apply a wrong procedure, for example, and it results in an unintended outcome.

Knowledge-based error: This is usually a mistake or inadequate human performance resulting from inaccurate understanding of a system or lack of expertise. Sometimes, workers have to depend on stored knowledge in dealing with situations, especially during crisis or when the unanticipated happens.

Although it is impractical to completely eliminate human errors in the workplace, as "to err is human," according to an old Latin saying, organizations can effectively manage worker errors by taking steps to reduce the chances of errors occurring and to minimize their potential consequences. Error management is an organizational strategy that focuses on understanding the causes of worker errors in the workplace and takes appropriate actions to reduce incidences and minimize potential consequences. Worker errors can be managed by creating systems that are able to accommodate errors and limit their effects and also by reducing their incidences through reduction design strategies. The reduction design strategies can be exclusive, preventive, or fail-safe. Exclusive strategies are those that make it impossible for the human error to occur. For example, human error hazards in equipment operations can be designed out during the design phase. Preventive strategies are those where systems are put in place to make it difficult for errors to occur but do not make it impossible to commit error. Fail-safe strategies are for mitigating the effect or consequences of a worker error, for example, a machine refusing to start because a dangerous component is exposed. A fail-safe strategy reduces consequences.

For effectiveness, error management must be done in a systematic manner. Errors should be identified systematically, with proper risk assessment carried out and adequate control measures put in place to reduce occurrence of errors and their potential consequences. This should be done in a nonpunitive manner in an environment of trust supported by a positive leadership. Where worker errors do occur within an organization, lessons should be learned and improvements made to prevent future occurrences.

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See Also: Decision Making Under Stress; Failover; Organizational Failure; Risk Assessment.

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World Health Organization (WHO), UN

Health is a right, and it forms part of the most common and critical needs of humanity; as such, throughout history the existence and effectiveness of agencies such as the World Health Organization (WHO) has been extremely important.

As a successor to the League of Nations' Permanent Health Organization, the WHO was founded in 1946 under the mandate of the United Nations to coordinate and guide international health policy and practice. The aim of the WHO was to assist with "the attainment by all people of the highest level of health," which was defined as "a state of complete physical, mental or social well being and not merely the absence of disease or infirmity."

Although it took until 1946, at the World Health Assembly (WHA), to develop an international health organization of its kind, it is arguable that this development had been long overdue.

Reasons for a Health Coordinating Body

The history of the world is punctuated with health crises, including, for example, the Great Plague in the 17th century and influenza between 1918 and 1919 that claimed about 20 million to 50 million lives around the world in the aftermath of World War I. History has demonstrated that in situations where health crises are not managed efficiently, lives may be lost, resulting in a paralysis of the normal functioning of a country, region, or locality, and a heavy economic and human price may be paid for inefficiency in managing the crisis.

In spite of significant human, social, and technological advancements in the 21st century, current opportunities brought about by migration and globalization may paradoxically provide the right conditions for a crisis to emerge relating to cross-border infections. Is also plausible to underscore that migration of humans is not the only factor likely to trigger health crisis when one considers the range of transborder agents that play a part, such as rivers flowing across international boundaries, airborne diseases, and wild animal movements such as those of birds, which cannot be effectively managed by official migration policies or practice. Indeed, around 2010, avian flu threatened to bring the world to its knees as normal disease prevention systems and controls were subjected to unprecedented pressures.

The WHO Organization

Mandated as a coordinating and guiding authority, the WHO has received mixed responses from some stakeholders regarding the extent of its success in meeting its objectives. The WHO's visibility in crisis situations on the international stage cannot, however, be easily disputed despite the organization not having been particularly successful in positively influencing its image like other United Nations agencies such as the United Nations Children's Fund (UNICEF). In spite of some concerns about its image, the agency in many ways has made some notable strides in health, including, for example, being a very reliable source of primary education and data in relation to the human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS) crisis that has defined much of the health discussions since the mid-1980s. Close examination of the WHO's work and history reveals that the diverse interests among its stakeholders have partly contributed to its somewhat burdensome/negative crisis of image. Considered as a whole, however, the discussion about the WHO's successes and shortcomings to mitigate and manage crisis can best be appreciated in terms of the categories outlined below.

Compliance

An important aspect of effective crisis management revolves around compliance in certain areas. Despite some criticisms of the structure of the WHO and the interrelationships between various parts of the organization, the WHO has shown some leadership in coordinating some issues that could have triggered a crisis. When people travel across borders, it is expected that they will normally consider obtaining an International Certificate of Vaccination. The WHO can designate diseases to apply as part of an imperative for international travel, which could lead to prevention of disease, epidemics, and loss of life.

Capacity Building and Partnerships

Effective crisis management also involves planning and having beneficial partnerships to enhance capacity. During its rather turbulent history, the WHO has made some positive contributions toward leadership and guidance in health, evidenced by some notable initiatives that have perhaps not been adequately acknowledged. In an attempt to manage a looming financial crisis likely to derail its programs, the WHO chose to reform itself by adopting a strategy that involved collaboration with private players, including, for example, the Gates Foundation, to found the Global Alliance on Vaccines and Immunization (GAVI), which focuses on targeting certain illnesses such as malaria.

Training and Development

Disease outbreaks happen, and it is essential that there is necessary expertise and systems in place to prepare and respond effectively in these situations to avoid their becoming a crisis. Thus, training and development on specific knowledge of how outbreaks happen and interrelationships between a range of practitioners and critical aspects of decision-making systems nationally and across borders are imperative. One of the most important elements of effective crisis management includes frameworks for dealing with the unexpected crisis occurring in world health. This may entail designing effective and tested strategies whenever needed. Thus, learning through research and sharing of information and vaccines across laboratories, health practitioners, and systems become necessary to inform decision-making processes where strategies need to be put in place with urgency. Indeed, there is evidence to suggest that the WHO has proactively and significantly helped in formulating platforms for sharing information and learning. An example of this is the pandemic influenza preparedness framework. This framework coordinates a range of stakeholders, including industry and member states, in implementing an international strategy for influenza preparedness and planning responses for the future. Aimed at addressing likely bottlenecks in an event of an influenza pandemic crisis, it aims to increase equity of access to vaccines and medicines for pandemics.

Crisis in the Organization's Image

The image of any organization at times has been affected negatively for reasons outside its own control. As the WHO principally depends on member states' funding for its key projects, some aspects of decision making to meet some of its primary objectives have at times been affected.

The WHO as an organization has sometimes faced financial pressures because of shortfalls in its budget resulting from member states' economic considerations as well as donor preferences. The WHO has projects and programs that are key to its objectives, and it has sometimes been necessary to reform and attract the required funds and support from a range of funders. Thus, the WHO has for some years also collaborated with private organizations, which in turn have significantly invested in some agreed health initiatives. This strategy has, however, at some points been met with fierce criticism from some quarters on ideological grounds. Critics have stated that the WHO demonstrated reluctance in criticizing the pharmaceutical industry for inhibiting access to medicines for the poor people of the world by way of market and pricing practices. Second, critics have argued that the WHO was collaborating with private funders, such as the World Bank, who were advocating damaging neoliberal approaches within WHO delivery systems, including the introduction of user fees for accessing health services. Thus, the WHO's attempt to solve the financial crisis within its organization through embracing private funders to deliver sustainable health services has not necessarily been without problems.

As can be noted here, whereas crisis management may involve issues related to the services offered by an organization externally, internal organizational issues are equally crucial to effectiveness. The external image of an organization, whether brought about by internal friction, failings in managing interrelationships or various aspects of procedures, or simply choices of partnerships in achieving goals, may enhance, hinder, and cloud the normal functioning of an organization.

Writing the Authoritative Chapter

The WHO has led the charge of providing the necessary health monitoring information to guide policy and practice. The agency has been crucial in offering both strategic and operational support, capacity building, and surge capacity during emergencies. Further to this, the WHO has played a key leadership role in coordinating research, developing effective communication and responses to health pandemics and epidemics, and responding during emergency response stages and has been successful in managing crisis. Through the cluster system that has been adopted by the United Nations agencies, the WHO is responsible for the health cluster. Cluster systems are approaches used for coordination of responses during emergencies. Under the cluster arrangement, humanitarian agencies or organizations with special expertise in specific areas of response are tasked to lead specified aspects of need.

Conclusion

Despite the somewhat mixed conclusions regarding the successes of the WHO and concerns about its image, when the chapter of the WHO's contribution to crisis management since its formation is finally written, the WHO's role is likely to occupy a respectable place. It has guided health policy and initiatives with a combination of public health care and technical support through some of the most challenging times, both economically and through disease outbreaks. It has spearheaded international immunization procedures and also delivered on databases and near-real-time information regarding potential pandemics such as HIV/AIDS and highlighted information on the impact of crises on individuals and families. Indeed, at the start of the 21st century, the WHO designed mechanisms for sharing expertise and knowledge on the prevention of avian flu and prevented it from turning into a world crisis.

In conclusion, the above discussion has highlighted both the successes of the WHO and the perception of crisis relating to the organization's image. It may be argued, however, that many of the issues at the center of the WHO have been unfounded and not of the agency's own making. Perhaps this crisis of the WHO could be addressed simply by being even more visible on the field, just as UNICEF has successfully done.

Martin Nthakomwa
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See Also: Cholera; Drug Resistance; Ebola Virus; Emergency Medicine; Epidemics; Health and Medical Response Scenarios; HIV/AIDS Epidemic; Infectious Disease; Infestations, Parasite; Influenza; Malaria; Measles; Pandemics; Public Health Surveillance; Quarantine; Severe Acute Respiratory Syndrome (SARS); Smallpox; Social Distancing; Triage; Tuberculosis; Vaccinations.

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World Water Relief

World Water Relief is a small charitable organization based in Atlanta, Georgia, focusing on providing clean water and hygiene education.

The locations of the organization's work are the Dominican Republic and Haiti. The group provides water filtration and works in schools to help children become aware of the importance of clean water and hygiene. The hope is that if the children see clean water and hygiene as important values, they will help transform their society by instilling these values as well. The organization works with partner groups.

World Water Relief seeks to bring a holistic approach to helping those in need of clean water. In addition to providing water filtration systems, World Water Relief has a program using the acronym WASH (water, sanitation, hygiene) as a basis for a platform to help children and their families. This approach is used in schools to reach the children first. In fact, World Water Relief has moved exclusively to using WASH in schools as its sole programmatic component for impacting those in need of clean water and education. In schools that are targeted by the charity, children receive education in hygiene issues. World Water Relief also provides purified drinking water to the schools with the use of three-stage filtration systems that are composed of sediment and carbon filters and ultraviolet disinfecting. Hand-washing stations are made available, and bathrooms at schools are upgraded to provide more sanitary conditions. Hygiene training is aided by the joint offering of English lessons. The opportunity to learn English is a big draw to the hygiene classes. World Water Relief's position is that impacting students empowers them to live better lives themselves and makes these students change agents for their families and communities.

Dr. Kevin Fussell, whose work led to the founding of World Water Relief, was on his fifth medical mission from North Carolina in a settlement in the Dominican Republic when he became alarmed at the continued cases of parasitic and intestinal cases they were seeing in the population. He became convinced that medical treatment alone was not going to be enough to address the needs in these communities. After research and conversations with other doctors, he was convinced that water contamination was a major cause of the problem. The contaminated water was leading to dangerous giardia infections. Giardia is a protozoa found in water contaminated by raw sewage or in waters where animals have impacted the water quality. Through Dr. Fussell's work and encouragement, World Water Relief was formed.

World Water Relief was founded in 2008 with a focus on water purification solutions being implemented in sustainable ways for those in developing nations. The first funds came from a gift from First Water, Inc., an Atlanta, Georgia–based company supplying water purification products and services in disaster settings. World Water Relief has a worldwide interest, but its initial efforts have been directed toward meeting needs in Haiti and the Dominican Republic. The Dominican Republic was entered first. In July 2009, the first project in Haiti was begun.

After the January 2010 earthquake in Haiti, World Water Relief made its disaster relief trip there within three days. Relief work was established in Port-au-Prince and included water-truck delivery coordination, installing water filtration units, and locating water tanks. Two solar-powered water filtration systems were provided initially. Other filtration systems were shipped there soon thereafter. Over two months, 18 portable filtration systems were installed. These systems provided water for at least 10,000 people. The group worked with churches, clinics, hospitals, schools, and tent camps. When World Water Relief first came into Haiti after the 2010 earthquake, it focused on short-term relief, but that focus has shifted to more long-term efforts. In Haiti, this meant moving most work from Port-au-Prince to the central plateau area, developing long-term projects with an eye to sustainability. An example of the focus on creating projects that are sustainable is shown by the fact that when the organization budgets for a project, it seeks to have sufficient money to maintain the filtering systems for 10 years. In Haiti, World Water Relief has also been involved in cholera prevention programs. The spread of cholera is increased by the presence of unclean water; clean water helps prevent this deadly disease.

In the Dominican Republic, World Water Relief is seeking to bring clean water to 18 bateyes located near the border with Haiti. A bateye is a sugarcane camp where Haitian refugees and poor Dominicans work. It was in one of these bateyes where the idea for World Water Relief was born.

World Water Relief gives credit to its board of directors for its efficiency. The directors' areas of expertise include business, finance, governmental, and philanthropic communities. The organization claims to rely on board members as well as other volunteers to give of time and areas of expertise in the work of World Water Relief. Financial contributions of the board members enable the charity to carry out administrative functions while using 100 percent of all donations on projects in Haiti and the Dominican Republic. In addition to the board of directors, there is an advisory council.

Partnerships have been developed with a number of organizations, including Children of the Nations, U.S. Agency for International Development (USAID), Partners in Health, World Vision, UNICEF, Global Soap Project, and Rotary International. World Water Relief also partners with local organizations to maximize the sustainability of implemented projects. Strategic partnerships and good practices are essential to the effectiveness of World Water Relief. When asked by a potential in-country partner for help in obtaining a source of clean water, the management team of World Water Relief studies the problem, does the proper engineering, and sources the resources needed to correct the problem.

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See Also: Earthquakes; Freshwater Demands and Shortages; Infectious Disease; Noncommunicable Diseases; Nongovernmental Organizations; Poverty; Vulnerable Populations.

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Y

Y2K Bug

Months before the close of the 20th century and the beginning of the 21st, much attention was paid to what was termed the Y2K Bug. Y2K is a “numeronym” denoting the year (Y) and the rollover into the new century, two thousand (2k). The perceived “bug” represented a problem in computer programming: computers, which had been operating with a simple date identification program beginning with “19” and ending in the last two digits of that year (for example, 19 [representing the 20th century] together with the year, 1998 [written as 98]), were expected to malfunction as computers made the switch out of the 20th century and into the 21st century.

The problem was conceptualized as significant and was perceived to be a widespread and global issue, as computer programmers and others who worked in industries that relied heavily on computers (e.g., banks, hospitals, stock market) worried that there would be a global shutdown as computers made the rollover transition from dates beginning with “19” into dates beginning with “20.” Further, significant concern arose about data processing capabilities when the previous two-digit dating system became obsolete and it became necessary for a four-digit dating system to come into existence. Given this valid concern on the part of programmers and business owners and operators alike, it became clear that the Y2K issue was one that could not be ignored, as potential simple programming glitches were increasingly being identified as preparations to move into a new computer dating system came into fruition.

Mitigation

Computer programmers expended extensive time and effort attempting to forecast potential Y2K bugs in then-current programming and sought to send out “patches” to various businesses and organizations in an attempt to fix any potential issues or problems as the transition was made out of 1999 into 2000. Notably, it became clear that some programmers had failed to take leap years into account when designing their time and date systems in several computer programs. This problem forced companies and organizations around the globe to check and upgrade their computer systems prior to January 1, 2000—some programmers had misunderstood that although years evenly divisible by 100 are not leap years, those divisible by 400 are leap years: 2000 was a leap year. Recognizing that there were likely to be issues with the computer dating systems, and anticipating major malfunctions if the computers were not patched properly, computer programmers sought to identify potential problems and computer clients early on and worked ardently to create the necessary fixes so as to permit as seamless a transition as possible into the new century.

Because computer programmers were proactive in attempting to develop the necessary patches to ensure a smooth computer-based transition into the 21st century, the anticipated problems (nonfunctioning ATM machines, glitches in air traffic control, problems with monitoring of critical care patients in hospitals, etc.) were limited. These remedial efforts on the part of computer programmers limited significantly the number of problems associated with the Y2K bug.

Legitimate or Overblown Concern?

Was it necessary for there to be such exaggerated concern over the potential Y2K bug, or did the concern itself propel computer programmers into attempting to solve computer glitches before they occurred to mitigate the potential for severe issues and complete computer shutdowns? Because many computer programs stored information using only the last two digits of the year (e.g., 1989 would be stored as 89), legitimate concern arose that computers would begin to represent incorrect dates, thereby wreaking havoc on the generation and maintenance of valuable computer data and potentially causing a complete shutdown of a computer system.

As it became clear when Y2K came and went, it is not known, precisely, whether there were extensive problems or shutdowns as a result of the initial date programming issue. What is known, however, is that relevant entities (banks, governments, prisons, etc.) took the necessary precautions, recognizing that there could be a potential problem with the transition to January 1, 2000, and that information technology (IT) professionals engaged in proactive problem-solving and sought out corrections and other trouble-shooting techniques in advance of the turn of the century.

What is notable about the Y2K bug is that while computer systems were expected to fail, thereby causing a domino effect of critical infrastructure to also crumble, the Y2K "problem" was nowhere near what it was anticipated to be because entities paid attention to the warnings about what "might" happen if computer systems were not patched properly prior to the beginning of the new millennium. As such, and because it was well documented that problems associated with the Y2K bug could emerge even after January 1, 2000, specific emphasis was placed on identifying the bugs that emerged as a result of date programming.

Typically, computer programs use a combined date and time stamp within a fixed binary field. This technique enables data to be stored easily based upon a simple logarithm. However, there were specific problems that emerged from date programming, including issues with Microsoft Excel, C-Programming, and Java Script. As such, while the leap year problem was definitely an issue, key problems relating to a possible Y2K computer shutdown were effectively mitigated in the United States through the passage of the Year 2000 Information and Readiness Disclosure Act, which was aimed at maintaining normal operations in the event of Y2K-associated problems. This Y2K Act created a three-pronged approach to potential problems posed by the shifting of dates into the new millennium that included outreach and advocacy, monitoring and assessment, and contingency planning and regulation.

Although most organizations and entities had Y2K contingency plans, there were neither centrally located solutions to problems with programming and leap year conversions nor universal "band-aids" to fix every possible glitch. As a result, the Y2K issue had to be anticipated and mitigated well in advance of the beginning of the 21st century in order to protect valuable computer systems, data, and even national security.

Dana M. Greene
University of North Carolina

See Also: Backup Facility; Backup Media; Backup Strategy; Business Continuity Planning; Cabinet Office, UK; Disaster Recovery Plan Test Cycle; Failover; Mitroff's Five Stages of Crisis Management; Warning.

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Appendix

2010 Annual Report

Bureau for Crisis Prevention and Recovery
United Nations Development Programme

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Foreword by Helen Clark

Empowered lives. Resilient nations.

A more just and equitable world is one which will be more stable and secure. Recent events in the Arab states remind us that economic and political exclusion can be a combustible combination.

The United Nations Development Programme (UNDP) works with countries to reduce poverty, promote democratic governance, prevent and recover from crises, and protect the environment and combat climate change.

Our Bureau for Crisis Prevention and Recovery (BCPR) has a critical role in supporting all of UNDP to meet these responsibilities by strengthening the capacities of countries to prevent and recover from crises. It assists countries to move from immediate recovery to longer-term development, as early as possible during and after crises, thus providing the essential foundation for sustained rapid human development.

Crises, whether generated by conflict or disaster, cause trauma and suffering. They impose human, social and economic costs which can last for generations, and set back hard won development goals. BCPR supports countries to build the capacity for recovery through the formulation of disaster risk reduction and crisis response strategies, and promoting early recovery. This support is instrumental in providing hope to the poorest, isolated, and most vulnerable population groups, who are often the most at risk from violence and the most seriously affected by disasters.

BCPR's role in crisis settings, its partnerships on behalf of UNDP with other UN agencies, and its ability to engage the development community more broadly, ensure that assistance can be provided rapidly, in the appropriate places, and with the maximum impact for those most in need. In that context, the Thematic Trust Fund for Crisis Prevention and Recovery, if adequately resourced, provides for a rapid and effective response at the country level, where time is of the essence and where other funding mechanisms can take time to be put in place.

At the end of last year, I approved a transformation plan for BCPR designed to strengthen the Bureau to respond even more effectively to the increasing demand for its services from Country Offices. As part of an overall UNDP effort, the Bureau will work especially hard to scale up our prevention work—helping governments, communities, and civil society to find solutions to tensions and conflict on the basis of consensus, and strengthening readiness for disaster. As was proved time and again in 2010, modest investments in prevention and preparedness do save lives.

Looking ahead, BCPR will be instrumental in UNDP's efforts to improve the security, rebuild the livelihoods, and restore the hope and dignity of the disrupted and displaced. This enables UNDP to fulfil its mandate to empower lives and build resilient nations.

Helen Clark

UNDP Administrator

Introduction by Jordan Ryan

As part of UNDP, and working through the UN system as a whole, BCPR is responsible for advancing peace and development by strengthening capacities of countries to prevent and recover from crisis and regenerating the well-being and livelihoods of those affected by natural disaster and armed violence. In our work, we are guided by a concept of 'HOPE', which seeks to restore 'healthy' societies after crisis; provide 'opportunities' for the poorest and most vulnerable; 'protect' communities from violence; and 'empower' women to contribute to their country's recovery. This annual report of BCPR describes our progress in meeting these responsibilities during 2010.

Our principal task at BCPR is to respond effectively and efficiently to requests for crisis prevention and recovery services by UNDP Country Offices. Their requirements during 2010 were many and varied. BCPR and its partners provided experts and programmatic support on rule of law, justice and security; small arms and mine action; disarmament, demobilization and reintegration; women's empowerment in crisis; disaster risk reduction; and livelihoods and employment creation.

In Burundi, for example, BCPR support led to increased political participation of women. In Kenya, efforts by UNDP Kenya, with assistance from BCPR, recovered and destroyed small arms and developed mechanisms to identify and defuse violence in advance of the referendum on the Constitution. UNDP's support for national and local dialogue and conflict management efforts in Kenya, Kyrgyzstan and Solomon Islands helped create the conditions for a non-violent outcome following elections. BCPR assisted 21 countries to create safe, stable settings as part of disarmament, demobilization and reintegration programmes. In Colombia and Sri Lanka, women's organizations were engaged to plan, implement and monitor community-based projects, and Peace and Development Advisors and similar specialists were deployed in 35 countries to support national actors in addressing emerging tensions, and building consensus around critical priorities.

Natural disasters often dramatically reverse development gains. Accordingly, BCPR made a major effort during 2010 to help reduce and mitigate the risks of disasters. It is difficult to anticipate disasters, such as the impact of the earthquake in Haiti (with over 300,000 killed) or floods in Pakistan (with more than 18 million people affected). Yet, the preparations made by BCPR and other partners in the UN system with respect to the Fast Track Policies and Procedures (FTP) proved to be extremely valuable. Within hours of both disasters the FTP mechanism had been activated and SURGE teams, composed of UNDP staff members redeployed to help UNDP country offices foster better recovery and development opportunities for people affected by crisis, were responding. BCPR mobilized 58 experts during January and May to support disaster mitigation and recovery in Haiti. In addition to expertise, BCPR also provided funding and programmatic support to the UNDP Country Office. An especially noteworthy outcome was the Fast Track support provided for cash-for-work and other emergency employment schemes. These initiatives served the displaced, helped resettle those affected, with women and youth specifically targeted for assistance.

Crisis and post-crisis situations are especially dangerous for women and girls and place special demands on prevention and recovery actors such as BCPR. Several achievements in 2010 made notable contributions to reducing sexual assault and holding accountable those responsible for sexual and gender-based violence (SGBV).They included the provision of legal aid services, the extension of mobile courts, the referral of SGBV cases to formal courts, gender-sensitive training of police, and the provision of special security to protect internally displaced persons, especially women and children. Disaster risk reduction planning is now gender-sensitive, and women's organizations are directly involved in crisis prevention activities and community-based development projects.

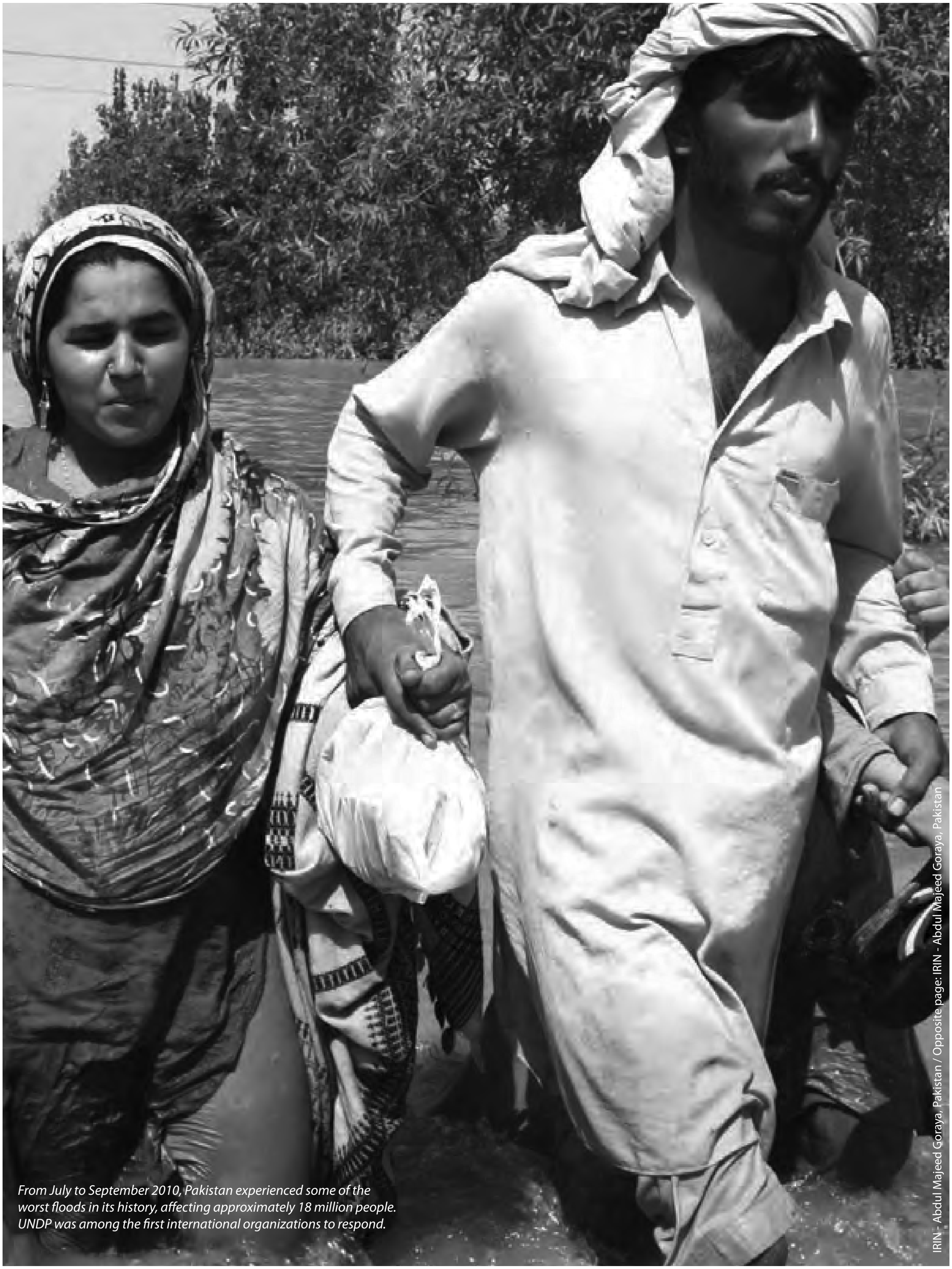
The strategic review of BCPR was completed in early 2010. The review emphasized the need to better integrate Crisis Prevention and Recovery within UNDP and the UN system, to be more strategic, results-oriented, and to provide more thorough and timely analysis and technical support in the areas of conflict prevention, disaster risk reduction, and early recovery. We now have a new operational structure, with most BCPR support organized in New York and a strong Liaison Office in Geneva. Work continues to better align BCPR's activities with the priorities of UNDP's regional bureaus. The reorganization of human resources is proceeding, senior managers have been appointed, and the operations of the Liaison Office in Geneva have been streamlined. A key dimension of the transformation has been the adoption of a Multi-year Results Framework that is supported by comprehensive agency-wide monitoring and evaluation of our activities. The transformation will continue into 2011 and early 2012 with the development of a monitoring and evaluation strategy, special emphasis on improving financial performance, expanding and deepening our partnerships, and further upgrading our information and knowledge management. Each of these will be boosted by additional support for senior management and leadership training.

A fundamental feature of BCPR's operations is cooperation and collaboration through a range of partnerships both within the UN system and with other development agencies. Several new partnerships emerged in 2010 and many of the existing partnerships were strengthened. Our relationship with the European Commission continued to evolve in constructive ways. BCPR has also deepened its cooperation with the World Bank. Current efforts involve a pilot study to improve governance and administration in post-conflict societies. The 2011 World Development Report on *Conflict, Security, and Development* provides a number of entry points through which UNDP can expand its cooperation with the World Bank. BCPR is actively supporting this effort.

Our work in BCPR confirms on a daily basis the harsh toll that disaster and crises take on regions and countries, and their people. All too frequently, it is the poorest and most vulnerable, particularly women, children and youth, who suffer the most. It is also these groups who tend to have the fewest capacities for recovery from crises. This is why we place so much emphasis on disaster risk reduction, being prepared to respond immediately when disasters or crises occur, and creating the partnerships and connections that ensure that early recovery efforts are well-organized and well-funded and deliver results. Through our partnerships both within and outside the UN system, we have accomplished a great deal over the last year, and indeed, in the decade since the Bureau's formation. Many challenges remain and I am confident that BCPR's transformation is taking the Bureau in the right direction to ensure we are better placed within UNDP to meet them.

Jordan Ryan

Assistant Administrator
and Director, BCPR, UNDP



From July to September 2010, Pakistan experienced some of the worst floods in its history, affecting approximately 18 million people. UNDP was among the first international organizations to respond.

IRIN - Abdul Majeed Goraya, Pakistan / Opposite page: IRIN - Abdul Majeed Goraya, Pakistan

1

ACHIEVEMENTS IN

Disaster Risk Reduction and Recovery

2010 was a devastating year for some of the world's most vulnerable. There were 373 earthquakes, floods, cyclones, volcanic eruptions, and droughts affecting 208 million people. The natural disasters of 2010 led to 300,000 deaths and, according to the Centre for Research on the Epidemiology of Disasters, involved losses of US$ 110 billion, making it one of the most expensive years on record.

Hazards are natural but disasters are not inevitable. Human losses and economic damage can be limited through comprehensive preparedness and risk reduction measures.

UNDP's work in Disaster Risk Reduction (DRR) has a high payoff. Building national capacities to manage risks significantly decreases mortality and recurrent disaster losses, accelerating post-disaster recovery and protecting development investments

UNDP in Action: Fulfilling Commitments on the Ground

During 2010, UNDP provided support to 78 countries to strengthen their capacity for DRR, Prevention and Recovery. As a member of the United Nations International Strategy for Disaster Reduction (UNISDR), UNDP leads specific technical areas guided by priorities set out in the Hyogo Framework for Action.

UNDP helped governments in 15 high-risk countries create a solid institutional and legal basis to reduce disaster risks. With UNDP support, four high-risk provinces of Papua New Guinea now have fully functioning disaster management offices with well-staffed and appropriately equipped emergency operations centres. Disaster management committees include representatives from Non-governmental organizations (NGOs), women's and

How can disasters affect progress towards achieving the Millennium Development Goals (MDGs)?

MDG	Direct impacts	Indirect impacts
Eradicate extreme poverty and hunger	Damage to housing, service infrastructure, savings, productive assets and human losses reduce livelihood sustainability.	Negative macroeconomic impacts (severe short-term fiscal impacts and longer-term impacts on growth, development and poverty reduction). Forced sale of productive assets by vulnerable households pushes many into long-term poverty and increases inequality.
Achieve universal primary education	Disasters damage education infrastructure. Population displacement interrupts schooling.	Children, especially girls, are forced to work in household labour rather than going to school. Reduced household assets make schooling less affordable, girls probably affected most.
Promote gender equality and empower women	As men migrate to seek alternative work, women/girls bear an increased burden of care. Women often bear the brunt of distress 'coping' strategies, e.g. by reducing food intake.	Emergency programmes may reinforce power structures which may marginalise women. Domestic and sexual violence may rise in the wake of a disaster.*
Reduce child mortality	Children are often most at risk, e.g. of drowning in floods. Disasters damage health and water and sanitation infrastructure. Injury and illness from disaster weakens children's immune systems.	Disasters increase the number of orphaned, abandoned and homeless children. Household asset depletion makes clean water, food and medicine less affordable.
Improve maternal health	Pregnant woman are often at high risk from death/injury in disasters. Disasters damage health infrastructure. Injury and illness from disaster can weaken women's health.	Increased responsibilities and workloads create stress for surviving mothers. Household asset depletion makes clean water, food and medicine less affordable.
Combat HIV/Aids, malaria and other diseases	Poor health and nutrition following disasters weakens immunity. Disasters damage health infrastructure. Increased respiratory diseases associated with damp, dust and air pollution linked to disaster.	Increased risk from communicative and vector borne diseases, e.g. malaria and diarrheal diseases following floods. Impoverishment and displacement following disaster can increase exposure to disease, including HIV and AIDS, and disrupt health care.
Ensure environmental sustainability	Disasters damage key environmental resources and exacerbate soil erosion or deforestation. Disasters damage water management and other urban infrastructure. Slum dwellers/people in temporary settlements are often heavily affected.	Disaster-induced migration to urban areas and damage to urban infrastructure increase the number of slum dwellers without access to basic services and exacerbate poverty.
A global partnership for development	Impacts on programmes for small island developing states from tropical storms, tsunamis etc.	Impacts on commitment to good governance, development and poverty reduction—nationally and internationally.
ALL MDGs		Reallocation of resources—including Official Development Assistance (ODA)—from development to relief and recovery.

Disasters hold back development and progress towards achieving the MDGs. Yet disasters are rooted in development failures. This is the core rationale for integrating disaster risk reduction into development. Source: http://www.unisdr.org/eng/mdgs-drr/dfid.htm. Icons: UNDP Brazil.

* Though data are scarce, a number of studies suggesting a surge in domestic and sexual violence against women in the wake of disasters are cited in, for example, Pan American Health Organization (2004), Emergency Information Infrastructure Partnership (1998), Wisner et al. (2004:16), possibly resulting from heightened intra-household tensions.

youth groups, and religious and civil society organizations. In Kyrgyzstan, UNDP provided technical assistance to incorporate DRR into the ongoing decentralization process. In Syria, UNDP successfully advocated for inclusion of DRR in the 11th National Five Year Plan while providing technical assistance in drafting the chapter on DRR. In Georgia, UNDP successfully advocated for incorporating DRR in the five-year regional development strategy for the Shida Kartli region. Indonesia also included DRR as a national priority in its National Mid-term Development Plan 2010-2014.

In Ethiopia, UNDP helped the Ministry of Agriculture to formally approve a comprehensive, integrated DRR programme in May 2010 and implementation began in June 2010. Since its adoption, the programme, along with other actors, has supported the integration of DRR issues into the new national development strategy and the establishment of the new Federal Disaster Risk Management Council (chaired by the Prime Minister) as an institutional mechanism for DRR. Creation of this top decision-making body signifies a shift from stand-alone emergency management to an integrated risk management approach. In support, the Government has initiated multiple programmes to mitigate food insecurity and climate risk through safety nets, weather and risk insurance, public works and cash transfer.

UNDP helps governments respond to a disaster by assessing needs, formulating plans, and implementing early recovery and longer-term programmes. As part of its support for rebuilding capacities, UNDP helps countries integrate risk reduction considerations into national plans and programmes. In 2010, UNDP's technical support and policy advice included:

Capacity assessments for risk reduction and recovery planning

Capacity assessments identify institutional gaps and technical skills that need to be improved for disaster risk management. They also engage key stakeholders by clarifying institutional mandates and improving planning. For example, in Armenia UNDP supported the Ministry of Emergency Situations to produce a Capacity Development Action Plan. This now guides the national DRR framework. The Disaster Prevention and Preparedness Programme in Dominican Republic aims to improve the country's prevention and recovery capacities in light of the disaster in Haiti, in close partnership with five governmental and non-governmental organizations. The UNDP Country Office and the Regional Capacity Development Cluster supported a capacity assessment and provided training on results-based management.
A workshop reviewed the findings leading to the creation of plans of action for each organization in the programme. In Lebanon, the Capacity Assessment exercise by UNDP produced an analysis on the institutional weaknesses of the High Relief Committee and prepared a blueprint for its revamping in order to make it a fully functional institution that has capacity to undertake disaster risk reduction initiatives.

Risk assessments

Improved risk assessment is a basic part of effective long-term disaster risk reduction and prevention. In 2010, UNDP's Global Risk Identification Programme (GRIP) provided technical support to 20 high-risk countries to assess their disaster risks by identifying and mapping factors that cause disasters. National Disaster Observatories were started in four countries: Armenia, Bosnia, Moldova and Mozambique where a historical disaster loss database is already operational with data for the last 30 years. National Risk Assessment was completed in Lao PDR and similar assessments were initiated in six countries: Bosnia, Lebanon, Liberia, Mozambique, Syria and Tajikistan.

In 2010, UNDP's Global Risk Identification Programme provided technical support to 20 high-risk countries to assess their disaster risks by identifying and mapping factors that cause disasters.

UNDP Egypt and Syria also supported the national authorities in developing disaster impact databases for a 30-year period, providing a historical analysis of risks.

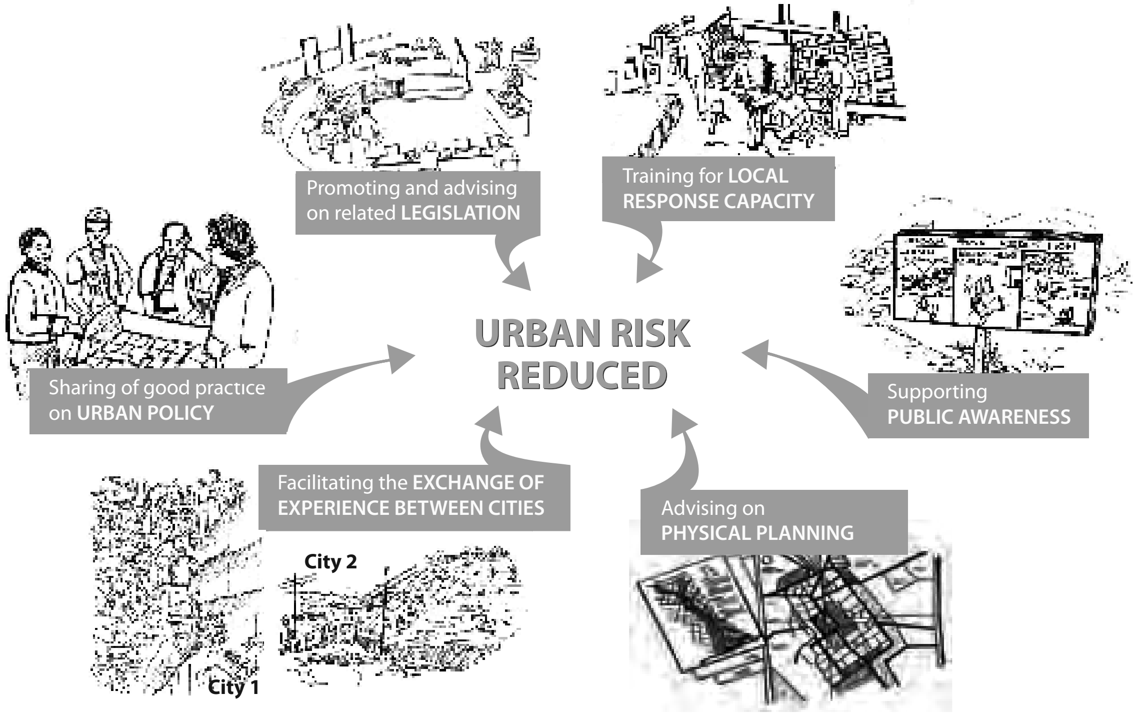
In addition, three assessments on the status of disaster risk were developed in Chile, Dominican Republic and Uruguay during 2010 in collaboration with UN agencies, the Economic Commission for Latin America, the International Federation of the Red Cross and the Organization of American States. These assessments represent a real and widespread effort of these countries to integrate DRR in the management of public policies and their political will to advance disaster risk reduction according to the Hyogo Framework for Action.

Urban Risk Management

With fast-rising world population levels, and with the world's urban population now exceeding its rural population, reducing urban risk is another growing key priority for disaster risk reduction. Reducing disaster risks in urban settings is closely linked to urban planning and governance. With UNDP support, earthquake risk, vulnerability and capacity assessments for selected urban areas were conducted in Bangladesh, India, Jordan, Nepal, and Pakistan. With support from GRIP, urban risk assessments were implemented in cities in Mexico, Mozambique, Nepal and Peru. UNDP promoted South-South regional alliances and exchange of knowledge among municipalities. For example, in collaboration with the European Commission, UNDP supported the local and metropolitan governments of five capitals of the Andean Region—Bogotá, Caracas, La Paz, Lima, and Quito—to collectively promote DRR and preparedness through sharing of best practices.

A Regional Urban Risk Programme for Central America was implemented in Costa Rica,

How does UNDP support capacities of local authorities and communities to achieve disaster-resilient urban environments?


Promoting and advising on related LEGISLATION
Training for LOCAL RESPONSE CAPACITY
URBAN RISK REDUCED
Sharing of good practice on URBAN POLICY
Supporting PUBLIC AWARENESS
Facilitating the EXCHANGE OF EXPERIENCE BETWEEN CITIES
City 2
City 1
Advising on PHYSICAL PLANNING

UNDP Mozambique

Local Risk Management Committee volunteers in a UNDP-supported training exercise transferring injured people to a tent offering first aid in Mozambique.

El Salvador and Guatemala. The interest expressed by other countries led to the inclusion of Bolivia, Colombia, Cuba, Dominican Republic, Ecuador, and Honduras. The programme allowed these countries to share urban risk reduction experiences, practices and tools.

Climate risk management

The Climate Risk Management Technical Assistance Support Project encompasses 20 high-risk countries worldwide in which UNDP promotes sustainable human development while accounting for impacts of climate related hazards and variability—droughts, floods, sea-level rise and extreme temperatures—in areas such as agriculture, water management, food security and health. Reflecting the regional dimension of climate change, UNDP launched in 2010 the Central Asia Multi-country Programme on Climate Risk Management (involving Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan), to pilot and scale up innovative approaches to climate risk management at the local level, while working at the national and regional levels to assess risks, elaborate strategies, and develop capacities.

Work with the private sector

By engaging with the private sector, UNDP increases the coverage and effectiveness of its risk reduction programmes. UNDP collaborates with Deutsche Post DHL to develop a disaster preparedness capacity building programme, Get Airports Ready for Disaster (GARD). The GARD Programme prepares airports and relevant staff to better respond to disaster relief surges, to train local people, and to assist local disaster relief agencies to plan and coordinate recovery efforts. In Nepal, the assessment and training at four regional and one international airports were completed in September 2010.

*The epic floods that affected **18 million** people across one fifth of Pakistan in July, August and September of 2010 were the worst ever recorded. UNDP was able to rapidly launch an early recovery programme to help communities in the worst-affected areas start to rebuild their lives while supporting government institutions in their efforts to respond to the urgent needs of the crisis.*

The effort was supported by the Government and other humanitarian agencies. The results of the assessment and the training have been integrated within the airport emergency plans and adopted by the Civil Aviation Authority of Nepal as part of its regular emergency preparedness plan.

Supporting post-disaster needs assessment and sustainable recovery

A Post Disaster Needs Assessment (PDNA) is a government-led exercise, with integrated support from the United Nations, the European Commission, the World Bank and other national and international actors, that pulls together information into a single, consolidated report, on the physical impacts of a disaster, the economic value of the damages and losses, the human impacts as experienced by the affected population, and the resulting early and long-term recovery needs and priorities. It is the basis for identifying, ranking, and implementing options for humanitarian and development responses. A key focus is reducing disaster risks so as to promote resilience. UNDP is the coordinator of the UN system for post-disaster recovery planning. In this role, it has been collaborating with the World Bank and the European Commission to integrate tangible risk reduction commitments into PDNAs and Recovery Frameworks.

The largest and most complex PDNA in 2010 was organized in the aftermath of the earthquake in Haiti. It was essential in formulating the Government of Haiti's recovery and reconstruction strategy. Following Chile's 8.8 magnitude earthquake, UNDP supported an assessment of that disaster's impact on the nation's MDGs. Post-disaster assessments in Pakistan focused on the effect of the floods on MDG achievement as well as physical damage and economic losses. PDNAs were also conducted in Indonesia in response to a volcanic eruption, tsunami and earthquake, and in Benin and Moldova in response to floods.

UNDP's Involvement in PDNA of Merapi Volcano Eruption

From 26 October until 5 November 2010, **Indonesia's** Merapi Volcano erupted killing 340 people, destroying homes and livelihoods, and damaging forests and public infrastructure in five districts in Yogyakarta and Central Java. UNDP, through BCPR, provided post-disaster technical assistance to the National Disaster Management Agency to conduct a Human Recovery Needs Assessment. By partnering with the local governments and a consortium of local NGOs, UNDP helped mobilize a team of 50 facilitators to conduct over 500 household surveys, interviews and focus group discussions to assess the impacts and people's recovery needs. The resulting HRNA formed the basis of the national action plan for reconstruction and post-disaster recovery, fostered cooperation among various actors responding to the disaster, and elicited resources from the national budget.

DRR and recovery

While it is difficult to anticipate the full nature and scope of disasters, DRR sets the stage for recovery by creating or identifying the required national capacities. UNDP implemented recovery programmes in 25 countries in 2010, as part of immediate response or pre-disaster recovery planning—Bangladesh, Barbados, Belize, Benin, Bosnia and Herzegovina, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, India, Indonesia, Kyrgyzstan, Lebanon, Lesotho, the Former Yugoslav Republic (FYR) of Macedonia, Mexico, Montenegro, Pakistan, Serbia, Suriname, Tajikistan and Yemen. To illustrate, UNDP helped Ecuador establish a National Meteorological Service station and equip situation rooms in four flood-prone districts with back-up high frequency radio systems to safeguard the uninterrupted transmission of data, monitoring of information and early warnings on flood risk. Together with other legislative and institutional developments, this ensures that disaster risk reduction is addressed comprehensively as a key development issue and not as a standalone emergency management effort. In the past four years more than 400,000 people, or 5 percent of the population in Honduras has been directly affected by disasters, including two earthquakes (2007 and 2009), two tropical storms (2008 and 2010) and a drought (caused by la Niña in 2009). Already the third poorest country in Latin America, these disasters intensify poverty. Supported by UNDP in 2010, the national government has now approved a legal framework to promote recovery from disaster and the Ministry of Planning includes recovery and risk reduction into regular development planning.

To improve recovery efforts worldwide, UNDP supported the International Recovery Platform (www.recoveryplatform.org). This is a virtual workspace for recovery planning. The Platform and its partner organizations have developed sector-specific recovery tools and guidance notes emphasizing lessons learned and good practices from global recovery operations.

UNDP implemented Disaster Risk Reduction recovery programmes in 25 countries in 2010, as part of immediate response or pre-disaster recovery planning.

A woman carries water on her head at a settlement for displaced people in Goz Baeda, Eastern Chad. UNDP supports sustainable socio-economic solutions for internally displaced persons, returnees and ex-combatants.

IRIN - Kate Holt, Chad / Opposite page: UN Photo - Marco Dormino, Haiti

2

ACHIEVEMENTS IN

Early Recovery

Early recovery is a collaborative effort that seeks to close the gap between humanitarian relief and longer-term development. The early recovery approach helps people become self-reliant and resume their livelihoods, allowing families to feel safe and return home, rebuild local infrastructure, and regain a sense of normalcy—a first step towards full recovery and development.

UNDP in Action: Fulfilling Commitments on the Ground

UNDP is the lead UN agency for early recovery within the UN system. At the country level, UNDP engages with national and international leaders to articulate and coordinate early recovery efforts guided largely by the post-crisis needs assessment. At the same time, UNDP helps national and local authorities formulate and implement programmes that effectively respond to assessed needs.

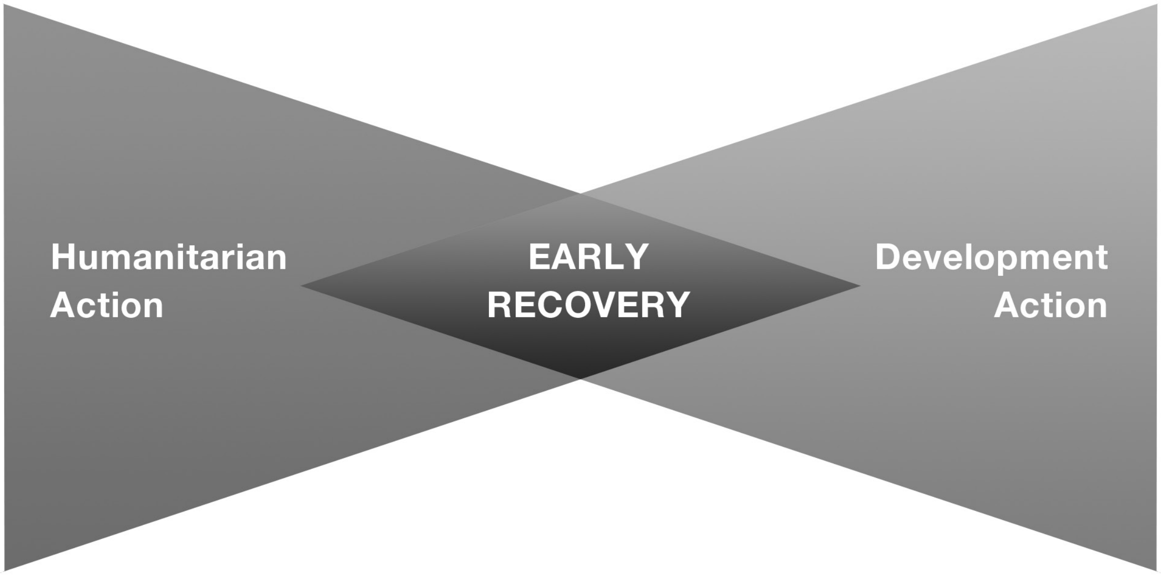
In 2010, UNDP provided early recovery support to 33 countries. These activities covered a broad spectrum in the following areas:

Generating livelihoods and economic opportunities with a special focus on youth and women's groups.

UNDP created emergency jobs and employment in viable enterprises or self-employment for more than 125,000 people in Burundi, Côte d'Ivoire, Democratic Republic of the Congo, Dominican Republic, Haiti, Honduras, Indonesia, Kenya, Mongolia, Myanmar, Nepal, Somalia, Sri Lanka, Sudan, Takijistan and Uganda. UNDP-sponsored cash for work and other productive employment initiatives have helped affected men and women from these countries with swift access to secure income, food security, money for small business start-up and access to key basic social services.

Continuing tension and unrest in Côte d'Ivoire stemming from the 2002 political and military

Early Recovery: development opportunities maximized even during humanitarian response



UNDP provides the critical link between life-saving humanitarian work and longer-term development. UNDP brings a development perspective to humanitarian operations and supports the rapid commencement of specific recovery actions through the 'early recovery cluster'.

crisis have created massive unemployment and limited economic opportunities. Young members of the population have been seriously affected. During 2010, UNDP focused on providing young people at risk with meaningful training and income-generating activities. 4,326 unemployed youth (of whom 1,841 were women) received professional training in simplified accounting and management, cooperative work and marketing, and technical training on activities including carpentry, sewing, trade, or soap making. An additional 3,900 (of whom 932 were women) were assisted with livelihood initiatives such as farming and fishing. The project directly created employment, helped increase food availability and local retail trade, and has brought fresh capital into local markets. The project also engaged community members whose assistance enabled young people to rehabilitate 10 health clinics and 13 primary and secondary schools, latrines and nurseries. The outcome is that formerly jobless and frustrated youth at risk, ex-combatants and ex-militia members are now busy running their own small businesses. An independent evaluation of the programme noted a decline in violent demonstrations, crime and violence against women.

In Honduras, UNDP-supported employment-creation initiatives benefited almost 21,000 persons who were affected by the tropical storm Agatha. An emergency jobs programme enabled families to start rebuilding their houses, businesses and public infrastructure such as schools, child care facilities, roads, and health clinics. Local economies have recovered rapidly, businesses are up and running, 100 houses have been repaired, 14 water systems are in place and four health clinics, five schools and five rural roads are again fully functional. The project provides innovative training in child care and nutrition to enhance the participation of women in cash-for-work activities.

Restoring community infrastructure in Côte d'Ivoire, Democratic Republic of the Congo, Myanmar, Nepal, Somalia, Sri Lanka, Tajikistan and Uganda.

In 2008 Tajikistan experienced the worst winter in 44 years. The frigid conditions overwhelmed the country's aging energy infrastructure and water supply systems. Essential services were affected and many health facilities and schools closed. Global food and fuel price increases aggravated the recovery—2.2 million people were food insecure; 800,000 severely so. The damage has been estimated at $850 million (23% of the country's gross domestic product). UNDP has assisted Tajikistan to recover from this 'compound crisis' by working with the Tajik Committee of Emergencies during 2010 on a comprehensive early recovery rollout programme. Costing $3.2 million ($2.97 million came from BCPR and $230,000 from UNDP Tajikistan), the programme emphasizes community level activities and the integration of early recovery into national disaster reduction policies. 144,000 inhabitants of 39 rural settlements have been supported to rehabilitate social infrastructure such as schools, hospitals, irrigation channels, roads and bridges. Local authorities and community representatives jointly identified the activities, responded to priority needs, and mediated disputes over resource distribution and access to livelihoods. Community members provided the labor and assets such as construction materials, machinery and tools. Cash-for-work clean-up of flood debris created temporary employment and the provision of livestock and food commodities helped 125 female-headed households re-start their bread and milk production businesses.

Supporting local governments for rehabilitation of socio-economic community infrastructure in Colombia, Dominican Republic, Kosovo[1], Somalia and Sri Lanka.

These initiatives contributed to the socio-economic recovery of over 250,000 people through improved access to water, enhanced quality of education, and the increased production of food and cash crops.

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[1] Hereafter referred to in the context of the UN Security Council Resolution 1244 (1999).

UNDP Tajikistan

UNDP helps countries in their efforts to restore community infrastructure. In Tajikistan, 144,000 inhabitants of 39 rural settlements have been supported to rehabilitate social infrastructure, such as with this electrical transformer in Rasht district.

In Focus:

Post Disaster Early Recovery

UNDP's task it to help Haiti rebuild into a more resilient country. As of December 2010, UNDP had successfully employed, together with the World Food Programme, 240,000 people affected by the earthquake, with a positive impact on more than one million Haitians. UNDP continues to work closely with the Government and local communities to put Haitians and their institutions at the centre of the recovery process.

UNDP Haiti

Haiti

On 12 January 2010, a 7.1 magnitude earthquake struck Haiti causing one of the largest human tragedies in recent decades—killing 300,000 people, displacing over 1.5 million, and wrecking the livelihoods of tens of thousands of households. UNDP offices were destroyed and many staff members' families were directly affected. UNDP rapidly established new premises and restored the functions of the Country Office.

Backed by newly developed fast track procedures that facilitate rapid deployments and procurement of services, BCPR mobilized both personnel and resources for early recovery efforts within 48 hours of the earthquake. Mandated by the headquarters Crisis Board, a SURGE Planning Team deployed to Haiti and Dominican Republic. The Team provided immediate support to management, assessed the needs of the Country Office, and planned for the months ahead in accordance with the Standard Operations and Procedures.

Between January and May 2010, 58 experts were fielded, representing an investment of $1.8 million. 35 of the SURGE advisors came from UNDP country offices and regional centres across the globe. Eleven crisis consultants and 10 experts were deployed to strengthen areas such as Early Recovery Coordination and conduct a PDNA. UNDP also helped upgrade and expand a government system to track all ODA commitments for recovery and reconstruction.

BCPR's immediate contribution of $3 million together with generous funding from over 20 donor countries and institutions enabled UNDP to launch cash-for-work activities for the most affected just eight days after the earthquake. With coordination between the Direction Nationale de l'Eau Potable et de l'Assainissement, local authorities, neighbourhood associations, NGOs and the ministries of agriculture and environment, the programme continued to expand as additional resources materialized. The initial effort focused on removing rubble and debris from the streets. Later, workers disposed of garbage, cleared drainage and irrigation channels in preparation for the rainy season, and undertook small-scale reconstruction projects. Partnerships expanded to include other UN agencies such as World Food Programme (WFP). By December 2010, the overall programme had provided employment and income for more than 240,000 individuals with a positive impact on more than one million Haitians.

Other BCPR contributions helped strengthen the national system on disaster risk management in anticipation of the 2010 cyclone season, and helped launch a seismic risk reduction programme with an investment of $1 million. Following the earthquake, BCPR's Rule of Law and Justice Project, costing $3 million, directly assisted the Ministry of Justice and Security. Its infrastructure and facilities had been totally destroyed. Equipment and temporary office space were provided as well as training and technical support to the police, the judiciary and the Office de la Protection du Citoyen.

UNDP Staff in Action: Eric Overvest, UNDP Country Director, Haiti

Haiti's Earthquake struck whilst many staff were on Christmas Break. Eric Overvest recounts receiving the news and immediately returning to Haiti as UNDP's Country Director.

"The first priority was to look for staff and get clarity on their condition. The roads were blocked. Bodies were lying in the streets. The office was no longer there. We relocated to 'log-base'—the MINUSTAH military police training area and it soon became crowded with humanitarian organizations." Eric's pre-fab office became his home for the next two months. He shared his working and living space with ten colleagues. "Getting the office operational was a big challenge. All computers and office supplies were lost and all but a few shops were destroyed. We flew to Santo Domingo to bring back essentials." UNDP's SURGE team arrived 48 hours into the crisis to support the Country Office. "We were so happy when that first group arrived," Eric recalls. "We really needed help in getting capacity up and programmes running." Within a few other days, the first group of 500 workers was already clearing rubble from roads. UNDP's recovery programme had started.

"Cash-for-work was a particularly good option," Eric states, "because it gave dignity to the people. They choose how to use their own money." UNDP already had experience with cash-for-work for waste removal in Haiti during the 2008 hurricane and UNDP's long relationship with the government ensured a rapid kick-off to the initiative.

A regular day in those first weeks had Eric rising early and preparing for the seven a.m. staff meeting. The Government's 'Crisis Team' met at eight—chaired by the Prime Minister with the Ministers of the Interior and Information—providing information that would influence the day's activities. Coordination meetings with all the UN thematic clusters followed. Staff security and human resource issues were always prominent, dealing with traumatized colleagues, endeavoring to get compensation so as to buy shelter material, to cover funeral costs. After that came security clearances for project areas, preparing documentation, organizing transport and payments, working with the Mayor and other authorities. What were regular tasks in other country programmes were major hurdles in Haiti then.

As one of the main people responsible for the logistics and the formulation of the interagency PDNA, Eric struggled to set up tents with the necessary equipment in time for the team's arrival. At night he would sit down and prepare his daily situation report for HQ. "Colleagues become family. You get to know who snores."

"My main advice for people who go to similar situations, would be to make sure they find their own way to cope with stress… Know how much they can bear. Know when it is time to take a deep breath, leave the office, go for a run..." For Eric, having reliable colleagues really helped. His main satisfaction, however, was to see visible, concrete cash-for-work sites fully operational, to start seeing the streets clean again. "When you see this type of progress, that's what helps you to keep it all together."

Pakistan

From July to September 2010 Pakistan experienced some of the worst floods in its history. 18 million people were affected. UNDP was among the first international organizations to respond. It launched a comprehensive programme of early recovery and restoration of communities through three strategic initiatives: re-establishing capacities of local institutions; restoring livelihoods of vulnerable flood-affected people; and rebuilding basic and critical community infrastructure. The programme has been working in 39 districts with disaster management authorities at national, provincial and district levels to bring relief to the affected communities.

UNDP began with a pilot initiative that partnered with 17 local non-governmental organizations in the worst-affected districts to support community-level initiatives. Local knowledge facilitated a speedy response to the crisis and the bottoms-up approach built capacity in local institutions and supported community ownership. The programme was unprecedented in its direct support for the most vulnerable and affected people, including women and the disabled. Hundreds of female community organizations played a crucial role in identifying female beneficiaries in their communities. They also identified gender-specific needs for infrastructure projects. In addition, UNDP assisted with culturally sensitive interventions for females in the form of small grants, livestock support packages and specialized enterprise training. These helped women sustain their families from within their households. This focus on women has been widely recognized and appreciated.

UNDP Pakistan, Nahyan Mirza

UNDP supported women like Kaneez Bibi (left), a resident of the Cheekal East village in Pakistan, through income-generating projects allowing her to restore her and her families' livelihoods after the floods affected the community she lives in, which was hardly affected by the 2010 floods.

To improve governance, UNDP provided training in disaster risk management and equipment support to 150 government officers and facilitated the provision of lost ID cards. To restore the livelihoods of people affected by the floods, UNDP initiated cash-for-work and provided productive toolkits containing seeds and fertilizers. Overall UNDP supported 128 rehabilitation schemes for community infrastructure recommended by local communities.

Interview with Jean-Luc Stalon, Acting Country Director in Pakistan

"What made this crisis different from others was that it was not immediate. Not like an earthquake. We learnt day to day how serious it really was—like a slow tsunami."

Jean Luc-Stalon was UNDP's acting Country Director when floods peaked in mid-August, affecting 18 million people and inundating an area the size of England. Assessing the impact was not easy; reaching affected communities was nearly impossible in the initial days. "Our first priority was to get a sense of magnitude. You cannot build a response based on contradictory information…data have to be credible for an informed strategy to deal with a disaster of this scale. We established a Floods Control Response room so everyone knew who was doing what." With 600 field staff and 80 in the capital, UNDP's strength was its presence on the ground and its solid relationships with national and provincial authorities.

Jean-Luc ensured that UNDP liaised with donors, humanitarian organizations and the National Disaster Management Authority. "Decisions needed to be taken quickly. The moment rains subsided people would want to start going home. Early Recovery activities and the re-establishment of basic infrastructure needed to start at once. We needed to be well-positioned with key partners to make that happen."

Jean-Luc shifted the focus of some existing programmes to new recovery priorities. Recovery programmes commenced funded by reallocating $7.9 million from ongoing projects and an immediate injection of $4.7 million from BCPR. Their initial success helped generate a further $80 million from donors, including Japan and the European Commission. "It didn't take BCPR longer than a week to allocate that amount to Pakistan—allowing us to engage 17 community-based non-governmental organizations to start delivering to the affected people. Without this support it would have been difficult to rebuild the lives of those affected." Cash-for-work started, "providing money for basic goods—to open roads, clean markets, and re-establish basic infrastructure."

When asked for advice to people working in similar situations, Jean-Luc, who has worked for UNDP for 15 years in countries like Rwanda, Somalia and Côte d'Ivoire, noted: "Make sure you have an organized, well-coordinated office. Know what people are doing. Capitalize on their strengths, remain cool and give clear guidance. Establish your priorities. Concentrate on a couple of things where you have comparative advantage rather than trying to do too many things." Jean-Luc added the need to work closely with the government. "In Pakistan we have a good relationship, particularly with the Disaster Management Authority. We are their main partners. You have to build upon that relationship. Use it well."

3

ACHIEVEMENTS IN

Conflict Prevention and Recovery

Conflict prevention and recovery requires initiatives in diverse but related areas: Conflict Prevention; Rule of Law, Justice and Security; Disarmament, Demobilization and Reintegration; Armed Violence, Small Arms and Mine Action; and Crisis Governance. BCPR and its partners were active in all areas during 2010.

UNDP in Action: Fulfilling Commitments on the Ground

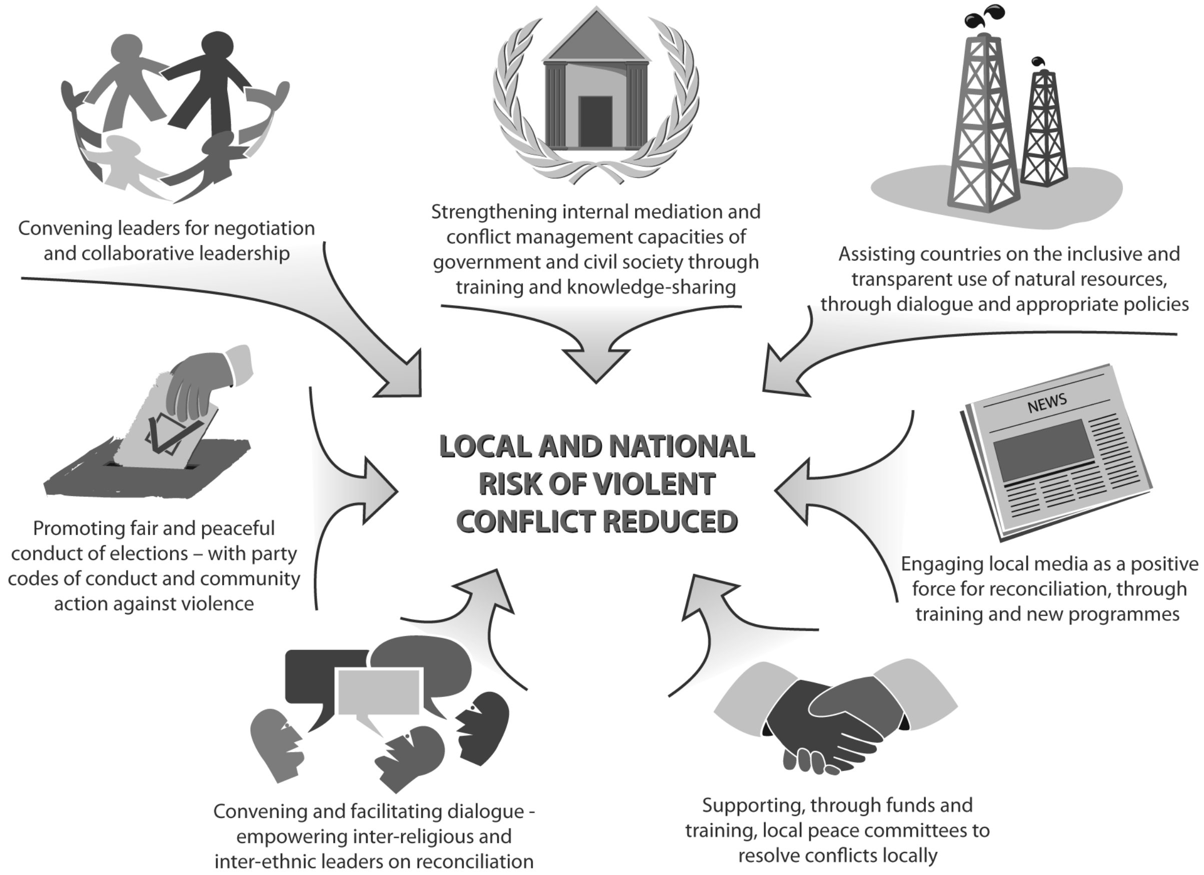
Conflict Prevention

Lasting peace requires that key actors possess the skills and have the forums and institutions that allow them to cooperate across political or sectarian lines. Demand from partner countries for UNDP assistance has grown over the past few years reflecting a growing realization that prevention is the best means of safeguarding developmental gains and avoiding the human suffering associated with disasters. Requests increased by almost 50 percent in 2009, as the number of countries requiring support to strengthen their own capacities for conflict prevention and management increased from 20 to 30. Even so, this reflected only half of an estimated 60 countries that are already receiving, or are likely to request, this assistance over the next two years.

UNDP's focus in conflict prevention is designed to assist national and local actors in addressing emerging tensions themselves, and to acquire lasting capabilities for managing recurring conflicts such as those around land, natural resources, and governance.

In 2010, UNDP contributed to mitigating ongoing tensions and fostering breakthroughs in political deadlocks at national and local levels in

What UNDP does to support National Capacities for Managing Conflict



Convening leaders for negotiation and collaborative leadership
Strengthening internal mediation and conflict management capacities of government and civil society through training and knowledge-sharing
Assisting countries on the inclusive and transparent use of natural resources, through dialogue and appropriate policies
NEWS
LOCAL AND NATIONAL RISK OF VIOLENT CONFLICT REDUCED
Promoting fair and peaceful conduct of elections – with party codes of conduct and community action against violence
Engaging local media as a positive force for reconciliation, through training and new programmes
Convening and facilitating dialogue - empowering inter-religious and inter-ethnic leaders on reconciliation
Supporting, through funds and training, local peace committees to resolve conflicts locally

10 countries. The focus was to establish credible platforms for dialogue, support cross-community confidence-building, and empower civil society groups. In Guinea-Bissau local tensions were defused and conflicts resolved through a UNDP-supported platform that included 20 youth organizations that encouraged inter-ethnic dialogue in their respective communities. A longstanding violent conflict in Benue state in Nigeria was resolved through mediation efforts conducted by a local women's organization with financial and technical support from UNDP. In August 2010, UNDP assistance in Fiji helped form an autonomous platform for dialogue, thereby enabling key stakeholders to develop priorities for actively engaging around selected themes. UNDP also assisted governmental and non-governmental actors in Honduras to explore a roadmap for dialogue and reconciliation, drawing from recent dialogue experiences between Ecuador and Colombia as well as conflict prevention efforts in Bolivia.

As part of its broader engagement, UNDP assisted with conflict resolution processes and electoral violence prevention mechanisms in 20 countries. The experiences in Kenya, Kyrgyzstan, and Solomon Islands are reviewed below (see box). Similar efforts contributed to peaceful elections in Togo and a referendum in Zanzibar in 2010.

Rule of Law, Justice and Security

During or after a crisis, national governments often do not have the capacities to protect citizens from impunity and respond to their justice

Preventing electoral violence and strengthening the foundations for more resilient societies

Kyrgyzstan, Solomon Islands, and Togo held peaceful elections in 2010 and **Kenya's** constitutional referendum occurred without incident. Vital assistance provided by UNDP to all four countries helped national actors mitigate violence.

In **Togo**, UNDP assisted a successful Togolese-led political dialogue, which produced an agreement in advance of elections on post-election governance reforms. The agreement included a national architecture for conflict management, modeled on Ghana's National Peace Council. With UNDP support, a 'code of conduct' for political parties was developed and a campaign for public peace and harmony undertaken.

Kenya conducted a peaceful referendum on a new constitution in 2010. The 2007 violence resulted in economic losses of around $3.6 billion. By contrast, violence prevention efforts in advance of the referendum cost roughly $5 million. Achieving a peaceful outcome involved three steps. UNDP facilitated each of them. Parliamentarians and leaders of the major parties reached consensus on a draft of the new constitution. District peace committees were strengthened and made operational. The March 2008 peace agreement, mediated by Kofi Annan, stipulated that these committees were to be formed in every district of Kenya to advocate peace and promote confidence-building. The Uwiano Platform to prevent national violence was developed. It connected a community-level network of mediators by phone and SMS to a Nairobi-based 'deployment' facility. The mediators had the capacity to arrive on time at locations where tensions were rising. Over 150 potentially violent incidents were successfully dealt with in the volatile Rift Valley province alone.

In the **Solomon Islands**, UNDP assistance contributed to a peaceful election. UNDP support to the Solomon Islands Parliament, the Provincial Governance Strengthening Programme, and the Truth and Reconciliation Commission are designed to be consequential in reducing political and community-level animosities and in rebuilding mutual trust as one of the steps for reconciliation in this post-conflict country. UNDP also partnered with the resident diplomatic missions, the Commonwealth and the Pacific Islands Forum to deploy a much larger and better-resourced group of election observers for effective observations. A joint UN Department of Political Affairs -UNDP team was deployed before, during, and after elections, providing security and political analyses to ensure smooth implementation of election and monitoring.

In **Kyrgyzstan**, potentially violent inter-ethnic tensions were diminished before and during the parliamentary elections in October 2010 in partnership with the European Commission. UNDP helped create space for dialogue by enhancing collaboration between civil society, law enforcement agencies and the Central Electoral Commission. Six Oblast Advisory committees were established and early warning telephone hotlines installed at national and Oblast levels to address potential conflict triggers that could have caused electoral violence. By coordinating with the UN Regional Centre for Preventive Diplomacy for Central Asia, UNDP facilitated the signing and implementation of a memorandum of understanding among the political parties.

and security needs. UNDP's Global Programme on Strengthening the Rule of Law in Conflict and Post-Conflict Situations enhances physical and legal protection of people and communities, ensuring adequate legal representation, access to justice, developing accountable institutions, and empowering communities.

In 2010 UNDP's Rule of Law Programme offered operational, technical and financial support to: Afghanistan, Bosnia-Herzegovina, Burundi, Central African Republic, Chad, Colombia, Democratic Republic of the Congo, Guinea-Bissau, Haiti, Iraq, Kosovo, Liberia, Nepal, Sierra Leone, Somalia, Sri Lanka, Sudan, Timor-Leste and Uganda, as well as to the occupied Palestinian territory.

The Global Programme developed multi-year country projects for a programming value of over $230 million. At the request of 21 different UNDP country offices, seven Global Programme technical staff spent a total of 346 days during 2010 providing field support. A key focus was helping citizens gain open access to rule of law institutions and improving the legitimacy of these institutions so that these fragile societies can prevent relapses into violence.

This was especially important in Sri Lanka where UNDP support enabled the Legal Aid Commission to establish five new offices in 2010, dealing specifically with criminal cases. This activity directly enhanced the access to justice by women and the displaced. This Commission undertook 1,684 consultations, 1,014 court appearances, 123 police visits, and 187 bail applications through 58 centres across the country. Community-based paralegal programmes in Nepal were expanded to 70 villages, significantly extending the reach of the law, especially for women. Mobile legal aid clinics provided free legal services and legal information to 1,524 people (80 percent of whom were women); and community mediation centres successfully resolved 60 percent of the 230 cases registered.

As a result of its support to ministries, the police, the judiciary and correctional centres in 18 conflict-affected countries, UNDP enabled these agencies to improve their service delivery. Citizens gained access to legal services that were formerly unavailable to them. UNDP invested in court and police facility infrastructure (Haiti, Liberia); provided technical and operational

UN Photo - Marco Domino, Haiti

UNDP has organised a series of trainings to public prosecutors, magistrates, judges and police officers in order to improve their capacity to deliver better services to Haitians.

support to increase the capacity to deliver justice and security services (Burundi, Colombia, Somalia); and boosted the numbers of legal and security professionals trained and deployed in-country (Central African Republic , Democratic Republic of the Congo).

In Kosovo, support by UNDP to the Parliamentary Oversight Commission for Internal Affairs and Security allowed its members to effectively review legislation designed to improve oversight and accountability mechanisms for security institutions. With improved accountability, impunity and neglect of the law have diminished. In Timor-Leste, UNDP supported the Office of the President's efforts to strengthen the security sector through the review and control of legislation related to security institutions.

A core aspect of UNDP's work on rule of law is responding to sexual and gender-based violence (SGBV). Through UNDP's assistance in Nepal, Sierra Leone, and Somalia, over 3,000 survivors of SGBV received access to justice services in 2010. In Democratic Republic of the Congo, six UNDP supported paralegal centers have assisted more than 183 cases on SGBV, while a partnership between UNDP and Avocats Sans Frontieres helped the South Kivu Bar Association to launch a pro bono office that provides legal aid.

Extending the rule of law, justice and security in Somalia

Beset by civil war since 1991 and without an effective central government, Somalia has difficulty extending the rule of law. UNDP is helping improve security in the country; ensure better protection under the law; and expand access to justice, especially for vulnerable groups. UNDP provided $2.6 million in 2009 for Somalia's Rule of Law and Security programme. In 2010, it consolidated the effort with additional technical support.

Significant, tangible results have been achieved. In Somaliland, mobile courts have extended the reach of the formal justice system in rural areas, hearing 418 cases in 2010, a 64 percent increase from 2009. In Puntland, mobile courts dealt with 321 cases, and expanded their presence to 50 villages, including two camps for IDPs.

To counteract gender inequality, often perpetuated by traditional systems of justice, UNDP supported arrangements through which clan elders refer gender violence cases to formal courts. In Somaliland, the Sexual Assault Referral Centre increased referrals by 44 percent compared to 2009. Of the 109 cases addressed so far, 89 involve minors. UNDP supported the Ministry of the Interior to establish and staff special units in Somaliland police stations for women and children victims of crime.

2,905 civilian police were trained on gender and human rights issues and UNDP assisted the Police Headquarters and the Criminal Investigations Department to establish Police Advisory Committees to monitor, mentor and train police and prison personnel on treatment of detainees.

Disarmament, Demobilization and Reintegration (DDR) of ex-combatants

UNDP's DDR activities supported through BCPR provide ex-combatants with access to employment and income-generation opportunities. Sustained support is critical especially during the period from conflict to peace and early recovery.

Throughout 2010, UNDP provided technical assistance to DDR of ex-combatants initiatives in: Afghanistan, Burundi, Central African Republic, Chad, Colombia, Comoros, Côte d'Ivoire, Democratic Republic of the Congo, Guinea-Bissau, Indonesia, Iraq, Kosovo, Nepal, Nigeria, Papua New Guinea, Republic of Congo, Rwanda, Somalia, Sri Lanka, Sudan, and Uganda.

UNDP helped generate emergency jobs and longer-term employment for 224,000 male and 72,000 female ex-combatants in Burundi, Colombia, Côte d'Ivoire, Democratic Republic of the Congo, Kosovo, Nepal, Republic of Congo, Sudan and Uganda. These represented roughly 10 percent of the estimated total of 224,000 male and 72,000 female ex-combatants in these places and, in the process, made a major contribution to the consolidation of peace and stability.

Preparations began in 2010 on eight additional DDR programmes (Afghanistan, Chad, Comoros, Guinea-Bissau, Indonesia, Iraq, Somalia, and Sri Lanka). Operations commence there in 2011.

UNDP's leading role in rehabilitating verified minors and late recruits in Nepal

When the comprehensive peace agreement between the political parties and the Unified Communist Party of Nepal (Maoist) was signed in November 2006, the UN Country Team assisted with registering and verifying Maoist army personnel. When these tasks were completed in December 2009, the Action Plan to discharge and rehabilitate verified minors and late recruits was signed. The discharge process began in January 2010 and was completed in February 2010.

The UN Children's Fund (UNICEF), the UN Population Fund (UNFPA), the International Labour Organization (ILO), and UNDP created the UN Inter-agency Rehabilitation Programme. Designed to support the transition of the dischargees into civilian life, it offered rehabilitation packages with 'sustainable livelihoods options'—formal education, vocational skills training, micro-enterprise start-up support, and health services training. By November 2010, approximately 60 percent of those eligible had contacted the programme, a process facilitated by the operation of a toll-free number. Of these, 44 percent have received career counselling and access to educational or training packages. 1,759 former Maoist army members (approximately 32 percent female), of a total of 4,008, have already chosen their selected rehabilitation package. Around 400 participants have completed the vocational skills and micro-enterprise programmes (a popular choice is technical training in repairing mobile phones).

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Hassan Abdalai Isahaq Ismail
R.State: Southern Darfur
Reg Date: 29/05/11

UN Photo - Albert Gonzalez Farran, Sudan

A man participating in a reintegration programme held at the National Service Camp in Nyala (South Darfur) shows his registration card.

Armed violence, small arms control and mine action

In 21 of the 31 national-led programmes against armed violence and small arms proliferation supported by UNDP in 2010, the focus was the reduction of the supply of weapons. Measures included the collection and destruction of firearms (Angola, Croatia, Panama and Uganda), the implementation of conflict-sensitive export controls, formulation of laws and regulations against illicit supply (Kosovo, Costa Rica, Democratic Republic of the Congo, El Salvador and Honduras). In Angola, for example, UNDP supported a civilian weapons-collection campaign that resulted in the collection of 76,000 illegally held weapons by mid-2010, while in Burundi more than 12,400 explosives and 2,000 firearms were destroyed and 9,000 police arms marked.

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In 12 of those 31 UNDP-supported programmes, UNDP emphasized measures that reduce the demand for weapons and drivers of violence. In 2010, UNDP assisted local communities in the participatory development and implementation of community security plans, which resulted in people-centred solutions ranging from the construction of Youth Community Centres (Liberia) to pastoralist resource management schemes (Kenya). UNDP also supported national level Violence Observatories (Burundi, Haiti, Honduras and Jamaica) to identify crime hot spots, pects for financial independence for 150 persons with disabilities. UNDP assistance enabled the Iraqi NGO Rafidain Demining Organisation to clear 494,545 square metres and the Danish Demining Group to clear 8,388,122 sqm and 3,865 unexploded ordnance (UXO). UNDP provided educational activities and training aimed at reducing the risk of injury from mines and UXO to 1,431 men, 1,432 women, 1,510 boys, and 1,484 girls.

In Mozambique, UNDP is supporting the Government to fulfil its obligations under the Anti-Personnel Mine Ban Treaty to clear all known mined areas by 2014 and to address residual threats posed by other ERW. In 2010 alone, 136 areas previously blocked to economic development because of landmines and ERW were cleared with UNDP's support. A total of 883 mines and 531 unexploded devices were removed and destroyed, and 37 districts in Cabo Delgado, Gaza, Inhambane, Maputo, Nampula, Niassa, Sofala, and Zambezia, Provinces, were completely freed of mines.

The Government of Lao PDR sought UNDP assistance with the organization, administration, and funding to prepare for the First Meeting of States Parties (1MSP) to the Convention on Cluster Munitions, held in Vientiane in November 2010. Together with the Government, UNDP established a Multi-donor Trust Fund for UXO activities in Lao PDR. UNDP is helping Lao PDR meet its obligations under the Convention. At the 1MSP, States Parties entrusted UNDP/BCPR with the executive coordination of work under the Lao PDR Presidency. In Lebanon, UNDP strongly advocated for the ratification of the

Over two thousand guns go up in smoke in Kenya

The Control Arms Campaign estimates that 639 million small arms circulate worldwide. Illegal weapons have increased in Kenya due to its proximity to Somalia and the Great Lakes Region and its porous borders. Small arms are replacing traditional weapons such as spears in conflicts over land, livestock and water. They also feature in urban crime.

In 2010, the Kenya National Focal Point on Small Arms and Light Weapons, with UNDP support, was upgraded to a directorate within the Ministry of State for Provincial Administration and Internal Security. Improved controls led to the surrender of 2,500 illegal firearms in 2010, many from members of pastoral communities. The Government of Kenya burnt the weapons and smelted the metal.

UNDP's assistance in the Garissa, Isiolo, Mandera, Marsabit, Moyale and Wajir districts of Northern Kenya has enabled the Government to reduce armed violence. A data centre established with UNDP support and linked to a National Steering Committee under the Office of the President provides early warning information on crime and violence.

UNDP - Jemaiyo Chabeda, Kenya

As part of UNDP Kenya's initiative to reduce and control the proliferation of small arms and light weapons, the Government of Kenya burnt to ashes over 2,500 illegal firearms at a public event recently.

Convention on Cluster Munitions, which was completed on 5 November 2010.

Crisis Governance

Fragile states and societies tend to be locked in vicious cycles of political, social and economic turmoil with governments often unable to respond to social expectations, manage the economy, or deliver essential services.

During 2010 BCPR worked with 12 countries to strengthen their institutions and reestablish governance processes. In Sri Lanka, Kosovo and Sudan, UNDP assistance enhanced local and national government capacities for planning so that recovery efforts reflected community-based priorities. UNDP provided technical expertise and seed funding for the Government of Southern Sudan (GoSS) to complete an assessment of core functions of statehood. This assessment was critical in preparing for the 9 January 2011 referendum on independence. The results as the assessment were endorsed by GoSS and presented to a High-level Technical Meeting on Capacity Development for South Sudan in Brussels on 17 September 2010. UNDP is charged with supporting follow-up and the development of a mid-term capacity development strategy. In Somalia, UNDP has assisted with extensive community consultations to draft district development frameworks and annual work plans. Monitored closely by recipient communities, these plans have led to improved service delivery. By July 2010, a total of 145,173 people were benefiting from these projects. Women participated actively with a 33 percent representation and are now part of monitoring groups during project implementation.

In Colombia UNDP supported the finalization of Peace and Development Action Plans in six conflict-affected regions. The Plans bring local governments together with victims of conflict, including representatives of 15 women's

UNDP Somalia

Somali Police training on communication equipment in Galkayo, Somalia.

organizations, to devise activities that reduce risks to human security. UNDP assisted the consultations that enabled the local governments to develop Plans. Based on these Plans, government funding has been allocated to support victim's rights, reconciliation, economic reintegration of displaced groups, and to reduce the marginalization of indigenous and Afro-Colombian populations. These consultations enhance social cohesion in conflict-affected regions.

Sri Lanka

The main goal for UNDP Sri Lanka's country programme in 2010 was a rapid return to normalcy for conflict-affected communities. The priorities were to assist IDPs to resettle and regenerate their livelihoods in the north and support early recovery in the eastern province.

UNDP used a performance-based grant mechanism to finance local authorities and assist 56 community-based organizations to undertake quick impact community projects. Grant instalments depended upon successful completion of financial management milestones. Projects included constructing and repairing access roads and bridges, drainage systems, public libraries and pre-schools, and renovating markets and improving playgrounds. These activities created or repaired critical community infrastructure and increased the capacity of local governments to respond to their constituents' needs.

Cooperating with local government authorities enabled UNDP to support over 6,500 people to rebuild their homes and re-establish sustainable income-producing activities in farming, fishing, livestock rearing, home gardening, and micro-enterprises such as sewing, and shopkeeping. These activities helped revive local cooperatives and producer groups, and rehabilitate facilities such as roads and markets that contribute to livelihoods.

Community members plan, implement, and monitor these projects. Rural development societies and small-scale contractors implement livelihood and infrastructure activities. Communities are consulted to identify the recovery priorities in their villages and encouraged to contribute their labour for construction and maintenance of the physical infrastructure. Training enhances this contribution. UNDP extended this approach to returnees and host communities, helping bridge ethnic, religious, geographic and caste-based divides and restoring trust.

Communities were provided with temporary avenues to justice through the repair of six court houses and extension of legal aid services. This resulted in over 2,000 consultations and strengthening of village-level paralegal capacities through training offered to 700 Grama Niladraris (village heads). UNDP supported community awareness-raising about legal issues particularly gender based violence.

4

ACHIEVEMENTS IN

Gender Equality in Crisis Prevention And Recovery

Guided by the priorities outlined in the Eight-Point Agenda for Women's Empowerment and Gender Equality in Crisis Prevention and Recovery, BCPR made progress in protecting, empowering and improving the prospects of women and girls in crisis settings during 2010.

For its part, BCPR continued to implement its gender-sensitive resource allocation policy to ensure that at least 15 percent of all BCPR-supported project budgets were assigned to gender-related activities. For 2010, 29 percent of BCPR expenditure fit this category.

Senior Gender Advisors (SGAs) supported by seed funding provided high-level technical and strategic capacity in Burundi, Iraq, Kosovo, Liberia, Nepal, Papua New Guinea, Sierra Leone, Sudan and Timor-Leste. Their activities helped UNDP Country Offices programme gender-responsive results-oriented initiatives designed to increase gender equality and women's participation.

UNDP in Action: Fulfilling Commitments on the Ground

BCPR stimulated tangible progress on the Women, Peace and Security agenda in global and national programming and policy and made a significant contribution to policy shifts. Key achievements in 2010 included:

Increased Women's Civic Engagement, Participation and Leadership in Peacebuilding

In 2010 UNDP produced tangible results in improving the political participation of women and their ability to play a leading role in the consolidation of peace. Improved support by UN/UNDP to national authorities in Burundi contributed to a historic female voter registration and turnout in the country's 2010 elections. As a result of the elections, the 30 percent quota for women in elected public office was exceeded. Burundi currently has the highest level of women representation in the Senate among African countries and second in the world.

UNDP Timor-Leste

Timor-Leste public defender Laura Lay is sworn in by Public Defender General, Sergio Hornai, with the President of the Court of Appeal, Claudio Ximenes, looking on.

With UNDP support women now constitute 50 percent of the Government's established cadre of mediators in Timor-Leste, under the newly created Department of Peacebuilding. These women assist with local land conflicts and other issues in communities targeted for the resettlement of IDPs.

In Nepal, women now have an increasingly important leadership role in the country's on-going political transition and constitutional design. Assisted by UNDP, women comprised 33 percent of the total of 601 delegates who participated in the country's constitutional process. The UNDP-supported Center for Constitutional Dialogue has trained 100 Constituent Assembly members, including women, on effective communication and negotiation.

Increased Local and National Capacity to Respond to Sexual and Gender-based Violence (SGBV)

SGBV devastates human lives, shatters communities and seriously deters human development in conflict and post-conflict contexts. UNDP's priority and added value is the strengthening of national capacities to provide justice and security to women, in order to create enabling environments where they can eventually participate in the economic, social and political spheres and where a culture of impunity, stigma and silence is eroded over time.

BCPR has developed programmes addressing SGBV in over 14 countries, enhancing women's security and access to justice. During 2010, over 4,000 survivors of SGBV received legal aid and assistance services primarily in Democratic Republic of the Congo, Kosovo, Nepal, Sierra Leone, as well as in Somaliland. An important part of this success has been the premium placed by UNDP on working through national justice and security sector actors, NGOS, paralegals and other service providers, as well as on strong partnerships with other international actors.

In Sierra Leone, UNDP supported six local NGOs to provide legal assistance to survivors of SGBV addressing the complaints of 1,879 women to date, resulting in 45 convictions. In 2009, before the programme began, there were no convictions.

In Haiti, UNDP supported communities affected by the earthquake to take preventive measures against SGBV. UNDP and the UN Stabilization Mission in Haiti (MINUSTAH) assisted the Haitian

Victoria Nwogu, Officer in Charge & Gender-based Violence Specialist, Rule of Law Programme, UNDP Sierra Leone

SGBV remains a legacy of conflict in Sierra Leone. Recent legislation criminalizes SGBV, but due to logistical, technical, and linguistic barriers and the continuation of customary law in many localities, victims of SGBV have difficulty gaining redress. Approximately 70 percent of the population use Local Courts or Chief's Courts which often do not apply national laws or meet acceptable human rights standards.

Since 2009, Victoria Nwogu, a Nigerian trained in law, has managed the UNDP Access to Justice project which helps victims of SGBV. Prior to joining UNDP, Victoria worked with the United Nations Development Fund for Women (UNIFEM) in Nigeria and Liberia on elections, governance, migration, and trafficking of women.

Victoria helps train officials of local courts, police prosecutors, civil society organizations (CSOs), and specialised police units that deal with SGBV on methods of bringing cases effectively to prosecution, and monitoring the activities of the formal and informal justice system. The formal justice system in Sierra Leone has limited reach with courts concentrated in three towns. A priority for Victoria is to assist CSOs to provide grants to women to cover the costs (for example for transport or medical certificates) of gaining access to these courts. "We need to empower CSOs that have a strong local presence as the main implementing partners." An independent evaluation in 2010 showed that the project has helped CSOs improve their knowledge of gender laws, respond to the needs of victims and their families more effectively, and establish a better working relationship with the family support units.

In collaboration with her team, Victoria works closely with national actors from governance institutions—the judiciary, the police, the Parliamentary Human Rights Committee, and the Human Rights Commission—linking them to CSO representatives of rural communities. "These linkages," she says, "are helping to promote the development of more responsive state policies, accountability for service delivery, and bridging the historical divide between state and society in Sierra Leone." Through these efforts the project has brought formal justice services to deprived rural areas and strengthened the administration of customary justice by training and monitoring personnel. This helps align their conduct with national law and international human rights standards. To date, there has been a 50 percent increase in reporting of SGBV offences to CSOs funded by the project, and a 141 percent increase in conviction for SGBV offences.

Victoria's work engages UNDP and media organizations in dialogue to determine how the media can advocate against and report responsibly on SGBV. Victoria trains journalists, studies incidents reported in newspapers, shares them with relevant partners for their follow-up, and helps develop guidance for media and incentives for journalists who report on SGBV, such as awards and fellowships.

Victoria is highly encouraged by the visible impact of the project. "The fact that women are now able to come out and report rape is a great motivation." Impunity with respect to rape and SBGV has dropped dramatically. "Nowadays it is very gratifying to see much more cooperation of the legal system, their willingness to apply standards and protect the laws. We're not there 100 percent but it gives you willingness to engage further."

National Police to establish special police groups for surveillance in sites for IDPs. This activity reduced the number of cases of SGBV.

The UN Task Force on Gender-Based Violence in Kosovo, led by UNDP, improves coordination to prevent and respond to SGBV. UNDP supported the development of the draft law on domestic violence. It provided technical assistance in Timor-Leste for the same purpose. In Iraq, the shelter policy for the Kurdistan Regional Government for SGBV survivors was drafted and has undergone consultations, while a Domestic Violence Bill draft is awaiting approval.

In Central America, UNDP contributed to the integration of gender related issues in all regional initiatives on violence reduction that have been endorsed by national authorities.

Increased Gender-responsive Disarmament, Demobilization and Reintegration

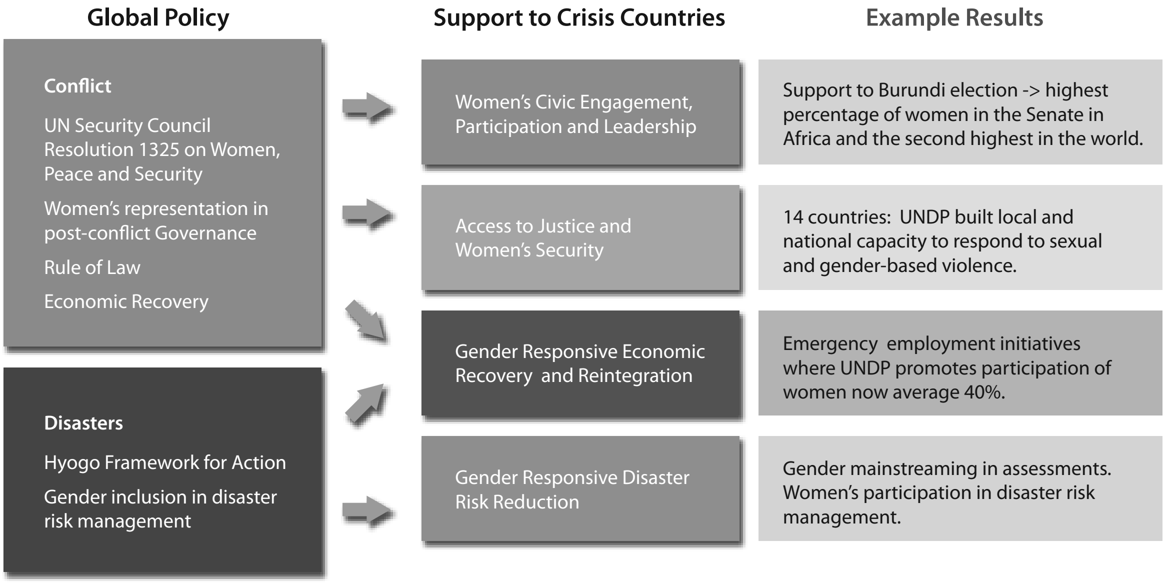
UNDP helped create viable job opportunities for 7,340 female ex-combatants and women associated with armed forces and groups in Burundi, Côte d'Ivoire, Democratic Republic of the Congo, Kosovo, Nepal, the Republic of Congo, Sudan and Uganda.

In the Republic of Congo, UNDP supported the economic integration of 1,056 female ex-combatants (out of 3,000 estimated in the country). This was done using a community-based approach to reintegration that identified market opportunities, used revolving microcredit, and included monitoring and counselling services.

Increased Support to Gender-responsive DRR Programming

Women are often affected more seriously by disasters than men. UNDP promotes the use of gender analysis to differentiate women's risks, impacts and needs from those of men and encourages women's participation and leadership. In Pakistan, a UNDP-led consultation conducted in the aftermath of the floods utilized gender disaggregated data including specific MDG indicators. These data are currently being used in the national recovery programme. In addition, as a result of the consultation, more than 50 female governmental, non-governmental, and private sector representatives participated in the planning and delivery of road construction and protection of slopes to avoid landslides.

Women's Empowerment in Crisis



Global Policy

Conflict

UN Security Council Resolution 1325 on Women, Peace and Security

Women's representation in post-conflict Governance

Rule of Law

Economic Recovery

Disasters

Hyogo Framework for Action

Gender inclusion in disaster risk management

Support to Crisis Countries

Women's Civic Engagement, Participation and Leadership

Access to Justice and Women's Security

Gender Responsive Economic Recovery and Reintegration

Gender Responsive Disaster Risk Reduction

Example Results

Support to Burundi election -> highest percentage of women in the Senate in Africa and the second highest in the world.

14 countries: UNDP built local and national capacity to respond to sexual and gender-based violence.

Emergency employment initiatives where UNDP promotes participation of women now average 40%.

Gender mainstreaming in assessments. Women's participation in disaster risk management.

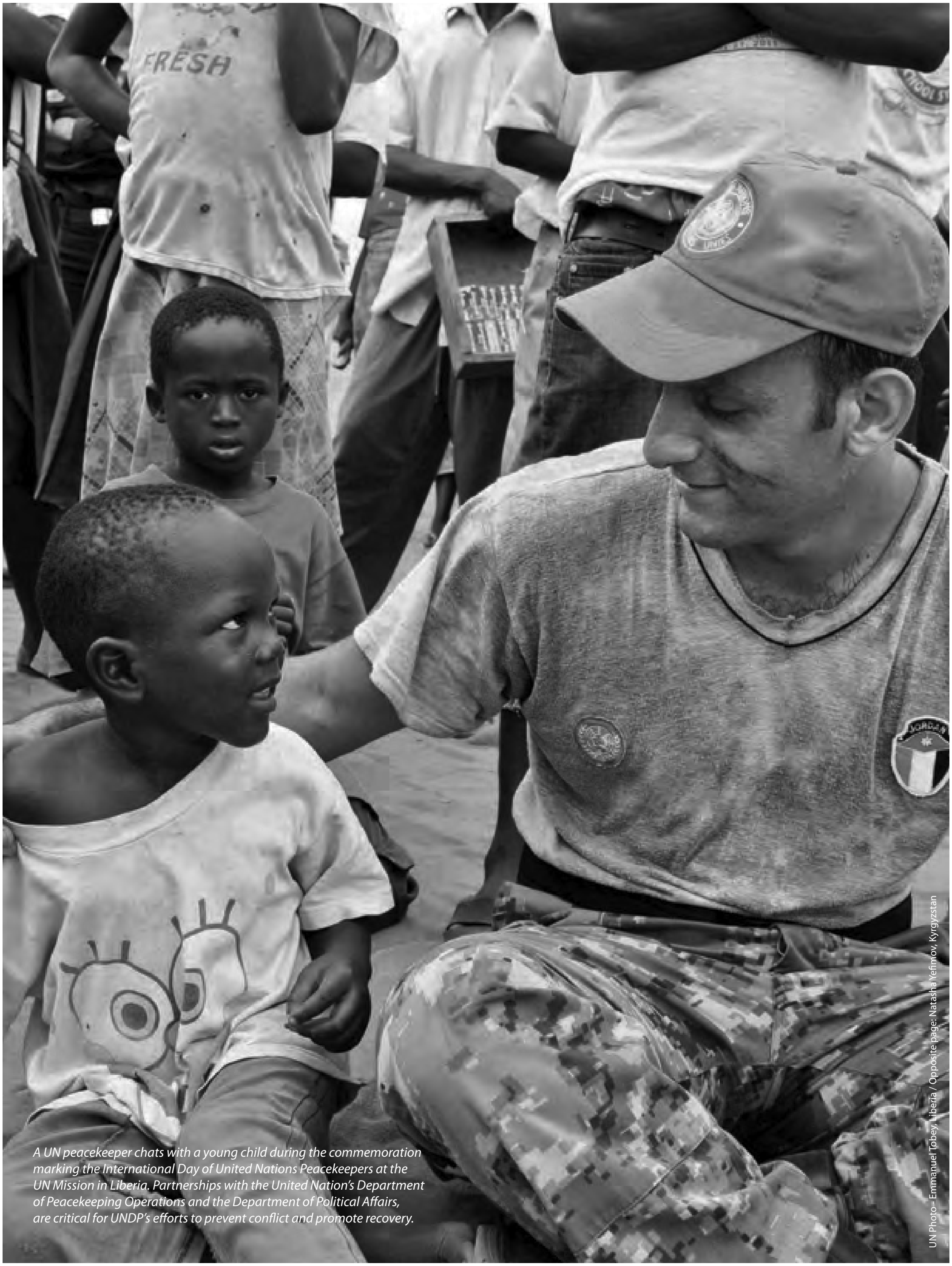
Fadwa (left), is enjoying an education for the first time in 26 years. The wood crafting skills she is being taught as part of a UNDP-supported initiative in Rafah in the southern Gaza Strip, will allow her to earn money to support her husband and seven children.

In the Former Yugoslav Republic of Macedonia, UNDP supported the Crisis Management Centre (CMC), which established a Gender Team mandated to promote and ensure gender equality and to address the needs of vulnerable groups (including women) before, during and after crises.

Increased Gender-responsive Economic Recovery and Reintegration

UNDP supports initiatives that bridge the gap between women's immediate assistance needs and longer term economic recovery by increasing the number of emergency jobs and employment made available to them.

The Programme of Assistance to the Palestinian People (PAPP) in the occupied Palestinian territory has enabled UNDP to assist 18,652 people become wage-earners in agricultural enterprises and community based organizations. Over 200 new graduates (60 percent female) received skills training in management, community development and livelihood recovery and were placed in various NGOs, community-based organizations and government departments for periods up to 15 months.



A UN peacekeeper chats with a young child during the commemoration marking the International Day of United Nations Peacekeepers at the UN Mission in Liberia. Partnerships with the United Nation's Department of Peacekeeping Operations and the Department of Political Affairs, are critical for UNDP's efforts to prevent conflict and promote recovery.

UN Photo - Emmanuel Tobey, Liberia / Opposite page: Natasha Yefimov, Kyrgyzstan

5

Global partnerships

BCPR's focus in 2010 was to promote inter-agency cooperation by building stronger connections among UN entities and with other key institutional partners, including the World Bank and the European Commission. These efforts build out from each partner's strengths to boost country-level support for crisis prevention and recovery. UN Resident Coordinators enhance the collaboration through focused strategic planning, broader dialogue with national authorities and development partners, and effective resource mobilization. BCPR's relationships with donors also bring much more than funds—with many engaged on policy and practical issues. This level of partnership is highly appreciated by BCPR and UNDP in general. Details on the financial contributions received through donor partnerships are referred to in the Financial Annex to this report.

UN partnerships

BCPR coordinates and leads UNDP's overall contribution to the consolidation of the UN peacebuilding architecture and to a more coherent UN effort on the ground as directed by the UN Secretary-General. This includes the Peacebuilding Commission, the Peacebuilding Fund (PBF) and the Peacebuilding Support Office (PBSO). BCPR supported PBF-funded peacebuilding initiatives in Guatemala, Kyrgyzstan and Uganda. Overall, PBF allocated more than $40 million for 32 UNDP projects in 2010—twice as much as in 2009. BCPR's cooperation with PBSO in the design of PBF projects improved implementation and provided for systematic follow-up and trouble shooting.

Partnerships with the UN Office for the Coordination of Humanitarian Affairs (OCHA), the

Samuel Akera/UNDP Lesotho

A school pupil from Mohlanapeng Primary school in Lesotho with the assistance of a facilitator helping her group to prepare a seasonal calendar for her community, as part of a community-based capacity assessment on disaster risks carried out by UNDP.

Department for Field Support, the Department of Peacekeeping Operations (DPKO) and Department of Political Affairs (DPA) are critical for UNDP's efforts to prevent conflict and promote recovery. Complex political conditions in many countries tend to compound the development difficulties. In countries without a Security Council mandated mission, UNDP worked with DPA to help reduce and resolve escalating tensions. In countries with a DKPO-led integrated peace operation, UNDP worked closely with mission partners to consolidate peace and played a key role in promoting and implementing an integrated approach in areas such as rule of law, transitional governance, conflict prevention, reintegration, mine action and security-sector reform. In order to ensure coherence UNDP was an active partner in developing Integrated Strategic Frameworks in 2010 in Kosovo, Haiti, Timor-Leste, Côte d'Ivoire and the occupied Palestinian territory. Other key results for 2010 included new joint programmes with DPKO-led peacekeeping missions in Democratic Republic of the Congo, Haiti, Liberia, Timor-Leste and southern Sudan.

UNDP cooperated with the UN Development Operations Coordination Office (DOCO) to strengthen UN leadership through planning and support capacities in seven priority countries: Central African Republic, Côte d'Ivoire, Democratic Republic of the Congo, Guinea, Guinea-Bissau, Nepal and Pakistan. 19 new positions were approved as part of this initiative and all recruitment was finalized in 2010. DOCO and BCPR jointly devised a method to measure performance.

UNDP and WFP signed a Cooperation Framework Agreement on September 24, 2010. The agreement identifies five substantive areas of partnership where both organizations can perform collaboratively, based on their comparative strengths: Livelihoods and Economic

Recovery; Disarmament, Demobilization and Reintegration; Mine Action; Climate Change/Disaster Risk Reduction; and the Cluster System. UNDP and the UN Office of the High Commissioner for Refugees (UNHCR) are also progressing with joint programming on a Transitional Support Initiative in several countries to support durable solutions to long-term displacement issues through development initiatives.

The World Bank

During 2010, BCPR broadened UNDP's engagement with the World Bank in crisis and conflict countries. BCPR held two rounds of high-level consultations with the World Bank and other UN partners to help focus the dialogue. BCPR consulted closely with the World Bank team producing the 2011 World Development Report on *Conflict, Security and Development*. With a grant from Switzerland, country-level cooperation between the UN and the World Bank will begin in 2011 in four pilot countries, Central African Republic, the Democratic Republic of the Congo, Guinea-Bissau and Liberia. Opportunities to work more with the World Bank on the Transitional Support Initiative will also be pursued in 2011.

The European Commission

UNDP's strong partnership with the European Commission (EC) continued in 2010. The EC provided $140 million for crisis prevention and recovery programmes and governance interventions in post-crisis countries. This was roughly the same EC portfolio share as in 2009. UNDP signed 11 contracts for rapid response for a total of $35 million with the EC's Instrument for Stability.

Policy interaction with the EC in 2010 was extensive. UNDP/BCPR staff members were trainers or guest speakers at 13 different EC events. There were five joint workshops as well. Looking ahead, UNDP will strongly engage with the new European External Action Service, particularly in the areas of peacebuilding and crisis management.

Partnerships in DRR

UNDP has encouraged the integration of a risk perspective in UN Development Assistance Frameworks (UNDAFs) that define development priorities for five-year periods. To assist Country Offices, a global mechanism for the deployment of experts has been set up with support from UNDP, DOCO, the UN International Strategy for Disaster Redution (UNISDR), and the UN System Staff College. DRR is already integrated as an UNDAF priority in Georgia and Indonesia, and support for DRR integration has been provided to Barbados, Ghana and the member states of the Organization of Eastern Caribbean States (OECS) as well as São Tomé and Principe.

UNDP is strengthening its partnership and collaboration with OCHA and UNISDR to support disaster reduction in Southern Africa and Latin America. Namibia is being used as a pilot case. In 2010, the Capacity for Disaster Reduction Initiative conducted a training workshop in DRR, and facilitated by BCPR, OCHA and UNISDR staff supported the establishment of a national platform. The three institutions will collaborate further in 2011 to strengthen regional-level DRR capabilities.

Partnerships in Early Recovery

UNDP leads the Inter-Agency Standing Committee (IASC) Cluster Working Group on Early Recovery, which includes 31 members from the humanitarian and development communities. Early recovery advisory and coordination mechanisms have been established in 32 of the 41 countries where the humanitarian cluster approach has been introduced. Supported by the deployment of 43 short- and long-term staff, 30 early recovery clusters or networks were

Early recovery advisory and coordination mechanisms have been established in 32 of the 41 countries where the humanitarian cluster approach has been introduced. Supported by the deployment of 43 short- and long-term staff, 30 early recovery clusters or networks were active in 2010.

active in 2010. UNDP deploys teams of advisors to Humanitarian and Resident Coordinators to ensure that early recovery is part of the work of all humanitarian clusters. The outcome is that responses by Country Offices are now more rapid, predictable and consistent with country-level strategy.

In 2010, UNDP became the co-chair of several important inter-agency sub-working groups. These include working groups on Needs Assessment and Capacities, Inter-Cluster Coordination, Transition, and on Preparedness to address improvements recommended by the IASC Principals.

Partnerships in Conflict Prevention

BCPR hosts the UN Inter-agency Framework Team for Preventive Action and manages the Joint UNDP-DPA Programme on Building National Capacities for Conflict Prevention. The UN Framework Team, an internal UN support mechanism, develops inter-agency conflict prevention strategies and UN-wide conflict-sensitive initiatives. The Joint UNDP-DPA Programme supports concrete initial steps to implement inter-agency conflict prevention strategies. It also supports the deployment of Peace and Development Advisors (PDAs). In 2010, PDAs and similar specialists worked to support conflict prevention and mitigation initiatives in more than 35 countries globally.

Partnerships in Rule of Law

BCPR engages closely with the broader UN system, including Member States, the PBSO, DPKO and the IASC. UNDP is a member of the Rule of Law Resource and Coordination Group, composed of nine UN entities attached to the Deputy Secretary-General's office.

In 2010, UNDP reassumed its role as co-chair with DPKO of the Inter-agency Security-sector Reform Task Force. UNDP is co-leading the roll-out of the 'Team of Experts' envisioned under UN Security Council Resolution 1888 for rapid deployment 'to

DANGER MINES

IRIN - Gwen Dubourthoumieu, DRC

A child walks through the Bangboka airport near a mined area in the Democratic Republic of the Congo. In 2010 UNDP continued to work with nationally-led programmes in 40 countries aimed at supporting mine action linked to broader sustainable development efforts.

situations of particular concern with respect to sexual violence in armed conflict.'

Partnerships in DDR

With EC funding, UNDP develops and applies integrated and more efficient DDR approaches at headquarters and field levels. UNDP cooperated with ILO to revise and validate the Integrated Disarmament, Demobilization and Reintegration Standards Reintegration Module, which has been used in DDR training globally.

In 2010 UNDP initiated a joint study with the UN Environment Programme (UNEP) on DDR and natural resource management to identify opportunities for linking reintegration and natural resource management. Case studies have been completed for Democratic Republic of the Congo, Indonesia and Rwanda.

Partnerships in Armed Violence, Small Arms Control and Mine Action

UNDP, through BCPR, leads much of the UN's work on small arms control and collaborates with 16 agencies and departments through the Coordinating Action on Small Arms mechanism. The Armed Violence Prevention Programme (AVPP), a multi-agency initiative involving UNDP, the World Health Organization, UNICEF, UN Habitat, the United Nations Office for Disarmament Affairs (UNODA) and the United Nations Office on Drugs and Crime, develops joint policy guidance, strategies and partnerships for armed violence prevention. The first AVPP mission was in September 2010 to Jamaica. Other priority countries are Bosnia and Herzegovina, Burundi, El Salvador, Kenya and Papua New Guinea.

UNDP, along with UNICEF and the UN Mine Action Service, forms the core of the Inter-agency Coordination Group on Mine Action (IACG-MA). UNODA and OCHA cooperate with this Group. During 2010, UNDP and the IACG-MA explored means of cooperating with the World Bank to research the linkages between mine action and the alleviation of poverty.

Partnerships in Crisis Governance

BCPR collaborated with the World Bank in 2010 to develop a joint strategy for supporting capacity development efforts in Liberia on crisis governance. The outcome was the establishment of an expert panel to provide on-demand advice to selected Country Teams.

In 2010 UNDP engaged actively in the Organisation for Economic Co-operation and Development (OECD) International Network on Conflict and Fragility work on state-building, peacebuilding and security.

Partnerships in gender equality in crisis prevention and recovery

To mark the tenth anniversary in October 2010 of the UN Security Council Resolution 1325 (on women's meaningful participation in peace processes), UNDP, DPKO, DPA and UNIFEM joined together in 25 conflict-affected countries to organize 'Open Days on Women, Peace and Security'—enabling more than 1,500 women to share their priorities and concerns for peacebuilding practice with high-level UN officials.

Through its partnerships with other UN agencies, UNDP helped address the marginalization of women and girls in institutional responses in the areas of DDR, small arms control and IDPs. In collaboration with DPKO, UN-Women, UNFPA and The Norwegian Defense University College, UNDP/BCPR contributed to the design and delivery of the first-ever training course on gender for UN senior-level DDR managers.

A farmer spreads fertilizer on his newly planted wheat fields that have replaced his poppy crop in Mian Poshteh, Helmand Province, Afghanistan. UNDP supports initiatives that contribute to the socio-economic recovery of people such as the increased production of food and cash crops.

IRIN - Kate Holt, Afghanistan / Opposite page: UNDP Côte d'Ivoire

6

Conclusion

The events and accomplishments of 2010 challenged and strengthened BCPR and overall highlighted the importance of the crisis prevention and recovery practice within UNDP. As this Annual Report has shown, BCPR has in large part stepped up to the challenges of supporting UNDP Country Offices, preventing and mitigating the effects of crises around the globe, and developing the partnerships and approaches that enhance UNDP's effectiveness and efficiency overall.

BCPR's noteworthy achievements during 2010 include:

- Deploying SURGE teams in more than 20 countries, the most challenging being Haiti where 58 experts were mobilized.
- Ensuring UNDP internal Fast Track Policies and Procedures reduced response times in crisis countries. First used in Haiti, 21 Country Offices applied FTP in 2010.
- Supporting 1,800 ex-combatants to be discharged under DDR arrangements in Nepal with livelihood packages and training.
- Facilitating the establishment of a system in Somaliland to refer sexual assault cases to formal courts.
- Expanding legal-aid services and enabling Sri Lanka to repair six court houses, strengthening village-level paralegal capacities, and training 700 village heads in legal issues including SGBV.
- Supporting the Government of Southern Sudan to assess the core functions of statehood as part of the preparations for the January 2011 referendum.
- Mobilizing a team of 50 facilitators to conduct household surveys and conduct focus-group discussions to assess impacts on people and recovery needs as part of a Human Needs Recovery Assessment in response to the eruption of the Merapi Volcano (Indonesia).

- Providing relief assistance to 19,500 families of IDPs in the Philippines and, working with local authorities, devising programmes to assist recovery efforts in 42 communities of return.
- Enabling over 24,000 people to gain self-employment through establishment of viable small and micro-enterprises in crisis and post-crisis countries;
- Supporting national actors to take concrete steps to ensure peaceful referendums in Kenya and Tanzania, and violence-free elections in Kyrgyzstan, Solomon Islands, and Togo.
- Supporting cash-for-work initiatives to restore community infrastructure schemes and clear rubble and debris in the wake of disasters in Pakistan and Haiti.
- Facilitating gender-responsive DRR in the Democratic Republic of the Congo through the economic integration of 1,056 female ex-combatants/formerly associated members.
- Helping create emergency jobs and longer-term employment for 25,000 male and more than 7,300 female ex-combatants in nine countries.
- Preparing for DDR programmes in eight additional countries.
- Assisting governments in 31 countries to work on reducing both the demand for and supply of small arms.
- Strengthening collaboration across the UN for implementation of UN Security Council Resolution 1888 (conflict-related sexual violence) to enhance gender-inclusive and sustainable peace, security and development.
- Stepping up action in 31 countries to implement armed violence-prevention programmes and supporting a further 40 states with national mine action initiatives.
- Promoting efforts in several countries to work with young people to defuse tensions created by economic rivalry, lack of employment opportunities, and inter-ethnic tensions.
- Building upon BCPR's leadership role in the Cluster Working Group on Early Recovery to promote the activation of early recovery co-ordination mechanisms in 32 countries.
- Working with the UN System, the World Bank and European Commission to assist governments develop the institutional agreements on the formulation of Post Disaster Needs Assessments.

IRIN - Guy Oliver, Zambia

A fisherman prepares his boat for a night of fishing on Lake Tanganyika in the northern Zambian town of Mpulungu. UNDP supports livelihoods and economic opportunities for people living in post-conflict situations.

Looking Ahead

Crisis Prevention and Recovery Results *are* Development Results

BCPR has existed within UNDP as a dedicated bureau for one decade. In this time more than 100 countries have been supported throughout numerous crises with the fielding of staff, programmatic advice and a total budget of approximately $1.3 billion. As a direct result, UNDP has managed to keep focused on its mandate—promoting human development—when stronger humanitarian and security agendas often prevail. Moreover, the skills, experience and resources that BCPR brings to UNDP have ensured much closer partnerships within the UN at large—promoting the organization's overall effectiveness in preventing and responding to violent conflicts and natural disasters.

These achievements have been possible with the dedicated, specialized capacity that BCPR brings to UNDP. In response to the Strategic Review, as BCPR's new structure, capacities and systems continue to take shape throughout 2011, operations will become increasingly strategic and results-oriented. Targeted Crisis Prevention and Recovery support will better align with ongoing UNDP and UN development actions in response to national priorities. Increasing the capacity of BCPR Technical Teams in New York will help ensure coherence within UNDP and the UN on policy and programming. Working more closely with UNDP's regional and substantive bureaus will also ensure much more efficient and strategic alignment of Crisis Prevention and Recovery inputs into country programmes and links to longer-term development policy.

The World Bank's 2011 World Development Report on *Conflict, Security and Development* highlights the challenges organized violence poses to the advancement of less-developed societies. This important policy piece, along with the UN's ongoing work on defining 'Civilian Capacity' requirements in post-conflict and peacekeeping settings, will guide much of the formulation of UNDP's Crisis Prevention and Recovery response into the near future.

The vision of BCPR into 2011 and beyond also aligns well with UNDP's overall 'Agenda for Change'—working to promote the increasing incorporation of Crisis Prevention and Recovery within UNDP country programmes as a fundamental foundation empowering people and ensuring resilience in nations.

Early Warning and Analytical Programming

UNDP's preparedness and response capacity will be bolstered in 2011 with early warning systems—which will help BCPR and UNDP Country Offices provide timely assistance to UNDP programme countries facing crises. An increasing frequency of disasters involving natural hazards also underscores the need to combine response with preventative action for natural disasters—as climate change combines with the effects of growing urbanization and natural resource depletion to enhance the vulnerability of many. Growing disparities between the rich and poor, accompanied with the rise of access to information through social media, points towards much of UNDP's work this decade being driven by opportunities to accompany national transitions to democracy.

Immediate Crisis Response

Although crisis risks may persist over years and decades, the exact timing of crisis events cannot always be anticipated. Haiti's earthquake in January 2010 was one such notable disaster from a little-known, natural hazard. Although not a humanitarian agency per se, UNDP must maintain a certain capacity for immediate response to ensure Country Offices receive capacity support and can, thus, remain during crises as an advocate for human development and as a competent partner with humanitarian and security-driven actors. BCPR in 2011 will move ahead with UNDP's overall ability to respond, including through the

IRIN - Kate Holt, Nepal

A woman at her home near Rupandehi, Nepal. UNDP made progress in protecting, empowering and improving the prospects of women and girls in crisis and post-crisis settings in 2010.

development of 'signature products' that can be quickly rolled out through UNDP Country Offices in a post-crisis environment. Some products, such as community-based recovery, will bolster UNDP's role as an actor in early recovery. UNDP's official role as coordinator of the 'Early Recovery' humanitarian cluster will also be strengthened by clarifying UNDP's policy in this regard and tightening links with UN Resident and Humanitarian Coordinators globally. The extension of collaborative agreements and partnerships will be looked into, along with in-house capacity, aiming to ensure early recovery support is appropriately focused and timely.

Women in Crisis and Post-Crisis Response

In crisis, the needs and potential contributions of women are taken seriously. Whether crisis is triggered by armed conflict or natural disaster, women bear the brunt of it. UNDP's gender policy and BCPR's specific 'Eight-Point Gender Action Plan' help ensure UNDP's actions in crisis serve to maximize the protection of women and their empowerment through the vital role they play in prevention and recovery. Throughout 2011 these efforts will be continued and strengthened—including through collaboration with UN Women to identify strategies and formulate options for creating mechanisms that empower women, especially in the aftermath of disasters and violence.

Conflict Prevention

As a core part of the 'Prevention Agenda', UNDP's support to national and local initiatives to build resilience to threats of violent conflict or potentially violent tensions will remain a key focus for BCPR. BCPR's transformation throughout 2011 will see additional capacity built in this area, with partnerships strengthened with PBSO on conflict analysis to support better peacebuilding strategies, and with DPA through the Joint Programme on Building National Capacities for Conflict Prevention, and the Inter-agency Framework Team on Preventive Action.

Climate Risk Management and Disaster Risk Reduction

BCPR will continue to promote detailed analysis of the implications for DRR strategies relating to a projected impact of environmental threats in the short term and climate change over the longer term. A priority will be determining what capacity needs to be developed to institutionalize DRR and build in-country capacity to analyse, prevent and manage risks related to climate variability and climate change and to identify climate risk-management solutions. Overall the DRR team will also be strengthened with rededicated capacity in New York and more robust linkages to the World Bank's Global Facility for Disaster Risk Reduction.

Post-Crisis Governance and the Rule of Law

As experience in much of the Middle East from late 2010 showed, the need to support national development priorities with improved democratic governance systems and capacities is likely to gain ground this decade. Immediate support to governance in the post-crisis context will be a key area of BCPR delivery into the future—teamed up with the experts on 'Democratic Governance' in the longer term through UNDP's Bureau for Development Policy. Rule of Law, Justice and Security needs will equally be important with UNDP building capacity on this front throughout 2011, and likewise has many links to the larger UN system such as DPKO and other security-related actors.

Livelihoods and Economic Recovery

As many post-crisis responses show, and further highlighted by ongoing events in the Middle East, the need to engage youth in recovery and preventative action is paramount. 'Emergency Employment' as a key UNDP signature product in crisis will be a fitting complement to UNDP's already-established work in reintegration and community-based, small-scale economic recovery. BCPR will be building up significant capacity in this area throughout 2011 and beyond, as well as strengthening partnerships such as with the ILO and the World Bank.

Monitoring, Evaluation and Knowledge Management

BCPR is committed to substantial improvements in both the design overview and reporting of results achieved with a major thrust planned in this area over the next two years. Requisite monitoring and evaluation capacity will be bolstered—as well as the 'consciousness of results' being mainstreamed throughout.

BCPR is fully cognizant of the fact that output level results—such as the number of workshops held or people trained—are of little real interest when evaluating the impact of interventions. BCPR is seized with the need to work with UNDP Country Offices overall to ensure accountability and make the absolutely best of scarce resources. A specific independent portfolio review of many BCPR-supported interventions will be undertaken in 2011—shedding light on approaches that are proving effective or otherwise. Partnerships and communities of practice will be fortified throughout with a proactive approach to knowledge management as lessons are learnt and these successes built upon.

BCPR is committed to substantial improvements in both the design overview and reporting of results achieved with a major thrust planned in this area over the next two years.

List of Acronyms

BCPR	Bureau for Crisis Prevention and Recovery
CPR TTF	Thematic Trust Fund for Crisis Prevention and Recovery
CSOs	Civil society organizations
DDR	disarmament, demobilization and reintegration
DOCO	Development Operations Coordination Office
DPA	Department of Political Affairs
DPKO	Department of Peacekeeping Operations
DRR	disaster risk reduction
EC	European Commission
ERW	Explosive remnants of war
IASC	Inter-agency Standing Committee
IDPs	internally displaced persons
ILO	International Labour Organization
ISDR	International Strategy for Disaster Reduction
MDGs	Millennium Development Goals
MINUSTAH	UN Stabilization Mission in Haiti
NGO	Non-governmental organization
OCHA	Office for the Coordination of Humanitarian Affairs
PAPP	Programme of Assistance to the Palestinian People
PBF	Peacebuilding Fund
PBSO	Peacebuilding Support Office
PDNA	post-disaster needs assessment
SGBV	Sexual and gender-based violence
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children’s Fund
UNIFEM	United Nations Development Fund for Women
UNISDR	United Nations International Strategy for Disaster Reduction
UNODA	UN Office for Disarmament Affairs
UXO	unexploded ordnance
WFP	World Food Programme

Glossary

Accountability: Having a responsibility to someone or for some activity, or being in a position of having to show proof or an account of something to a superior party. Assumption and acknowledgment of specific responsibility, especially in regard to a relationship between entities. For instance, a corporation is thought to be accountable to its shareholders, and an elected official should be accountable to his or her constituents.

Acute: Having a sharp point or tip and commonly used to describe a sharp angle or triangle. In medical use, having a sharp or rapid onset and following a short but severe course, such as an acute disease.

Adrenaline effect: The phenomenon of increased strength, senses, or reaction speed caused by the release of adrenaline as a response to fear, especially as experienced by people in jeopardy or protecting others in jeopardy (as with the textbook example of a mother accomplishing a superhuman feat of strength to save her children from imminent danger).

After action review: A debriefing process developed in the military but now applied throughout the public and private sectors. An after action review is a specifically structured debriefing analyzing an event and its handling, conducted by the participants and other responsible parties, and is a detailed after-the-fact analysis, the point of which is to create appropriate actions in future similar situations and understand which mistakes were made in order not to repeat them.

Agency: The condition of being in action or operation. In legal use, refers to a person or entity having agency or the prearranged and signed upon full power and authority to act on behalf of another person or other entity. It refers to legal sameness in authority given to an agent, agency, or representative of the principal person or entity being represented, or a representative who has the same power as the represented.

Alternate site: An alternate, secondary, additional, or backup location. A separate physical location employees can work from, for example, in the event that a primary workspace is damaged. Critical for the military and emergency services, alternate sites are also used in the private sector or may be developed as needed.

American Society of Civil Engineers: The oldest national engineering society in the United States, founded in 1852 by 12 founders who had gathered at the Croton Aqueduct in New York.

Anthropogenic: Human-made or that which results from human activity.

Arms control: Restrictions on the production, proliferation, and use of weapons, including but not limited to nuclear proliferation and other weapons of mass destruction. Generally, these are restrictions and controls among and upon national governments by others in regard to major weaponry.

Avalanche: The sudden flow of snow down a slope, which may include rocks, ice, and debris caught up in the flow. The stability of accumulated snow on a slope may be fragile enough that an avalanche may be set off as snow at the lowest layer begins to thaw, when new precipitation lands and creates an additional weight, or when a vibration disrupts the unstable balance.

Backdoor: A rear entrance; sometimes a reference to an unknown or a little-known entrance. In hacking, a method of bypassing normal authentication or authorization processes, whether it originated with the initial programming or was installed by a hacker.

Backup: An additional, redundant copy. For instance, a backup power generator may be used to provide substitute power if a primary power source fails; or a copy of data (a backup copy) may be stored separate from the original, especially for the purposes of restoring it, should something happen to the primary data storage source.

Best practices: The observation of different methods and/or procedures that are used to produce results or an end product. Of these practices, those judged to be the most productive or efficient might then become a new standard or method, which is then considered the best approach. The development of best practices may be looked upon as critical in crisis management, where every new crisis may provide illustrations of the efficacy of methods.

Bifurcation point: The point at which bifurcating occurs; bifurcation is the action of division into two branches or parts. The point at which a small change made to the parameters of a system causes a sudden topological change in its behavior. The bifurcation points that result in avalanches and landslides are two examples of phenomena studied by catastrophe theory, a branch of bifurcation theory.

Biotechnology: The use of living organisms and biological processes in engineering and technology. Creating human-designed mechanisms that might construct a desired result out of cells or on a genetic level.

Bioterrorism: The use of biological agents such as toxins or bacteria for terrorist ends.

Blizzard: A severe snowstorm. As with hurricanes, blizzards are defined not by the volume of their precipitation but by their wind speed: a blizzard is a prolonged snowstorm with sustained gusts of at least 35 miles per hour (mph). Severe blizzards are characterized by stronger winds (45 mph), temperatures below 11 degrees F, and near-zero visibility.

Botnet: Referring to the Internet, it is a network of compromised computers ("bots") directed by an attacker, especially to run malicious software or devote their resources to an orchestrated attack elsewhere. These could also consist of hijacked and remotely controlled computers and networks.

Brain drain: Emigration (the exiting migration) from an area, region, or nation, especially the ongoing emigration, of skilled intellectual and technical labor (e.g., engineers, scientists, technologists, or academics), for better pay, equipment, or conditions in a more favorable geographic, economic, or professional environment.

Bunker: A bunker is a military fortification that protects the inhabitants from falling bombs and artillery. The word can be used to define any protective positioning, method, or style. The term is also used figuratively to refer to a fortified protected area, such as a data bunker where critical data is stored offsite.

Business continuity planning: Also called resilience or resilience planning, the term refers to the construction of a plan to preserve business operations during a crisis. Specifics can range from operating a backup power generator in the event of a blackout to the handling of ongoing business processes in the event of a physical disaster damaging or destroying the workplace, to the unplanned departure of key executives or team members. An important element of business continuity planning is identifying the contingencies for which to plan. Literally, the term refers to the planning to provide for methods to allow a smooth continuance of business during unforeseen problems.

Business impact analysis: Part of business continuity planning, a business impact analysis (BIA) determines the impact of each component's function or activity on the business in order to separate them by criticality (or importance to the whole of the business) and to determine which functions are most important to the continuity of the business.

Butterfly effect: The classic theoretical example of chaos theory, in which the movement of the wings of a butterfly might eventually result in the formation of a hurricane, though it is a tiny change to the system of wind patterns. Considers the altering and amplification of patterns.

Carrying capacity: The total amount that can be carried by any type of vehicle. The maximum population size of a species that can be sustained by the environment.

Catastrophe: An event causing great and usually sudden damage or suffering. A large-scale disaster.

Catastrophe theory: The mathematical study of the phenomenon whereby small changes to a system result in dramatic changes in behavior, such as the sudden occurrence of a landslide after a small alteration.

Catastrophism: The theory that the surface of the Earth has been shaped primarily not by incremental change but by sudden violent events such as eruptions and earthquakes.

Chaos theory: The mathematical study of dynamic systems that, though deterministic, yield a wide variety of outcomes from small differences, making it impossible to make long-term predictions. Weather is one such system.

Chemical weapons: Weapons of mass destruction that use toxic chemicals to kill or injure.

Cholera: A small intestine infection caused by the *Vibrio cholerae* bacterium, spread by ingestion of fecal matter from an infected person. Epidemics are most likely in parts of the world with water quality issues.

Chronic: Marked by long duration, by frequent recurrence over a long time span, and often by slowly progressing seriousness. Not acute.

Citizen Corps: A U.S. Department of Homeland Security service program designed to mobilize citizens in the event of disaster, terrorist attacks, or threats to national security.

Civil engineering: The engineering discipline focused on nonmilitary construction and design, such as buildings, canals, roads, and bridges.

Civil war: An organized, prolonged armed conflict between groups in the same country. A civil war may be fought for control of the country or because one side seeks independence. The term is also used to refer to wars between states that originated as parts of the same state, particularly if war breaks out shortly before or after that division. Wars that originate as civil wars but draw other countries into the conflict are generally considered internationalized civil wars, rather than interstate wars. Since the 20th century, civil wars have dramatically outnumbered interstate wars.

Cloud: In computing, "the cloud" is a metaphor for the infrastructure used to store and handle data on remote servers rather than saving the data locally on the user's computer. Cloud computing has a number of advantages, but it particularly appeals to users who use multiple devices, some of which may be mobile, with which they want to have access to the same data and software.

Cognitive novelty: Cognitive novelty is the newness of a situation to the mind. In most people, the stress response is strongest the first time the person deals with a new source of stress or threatening situation; stress response decreases with repeated exposure even if the severity of the threat does not.

Cold site: The cheapest form of alternate site, a cold site is a facility from which an organization can operate in the event of a disaster, but does not include backups of data or files, nor equipment prepared to resume business operations.

Containment: The act of restricting something to a well-defined area. In disasters, this includes the effort to contain damage or hazards to the area already affected, whether that means preventing a fire from spreading or stopping a hazardous waste spill from entering an area. Containment buildings are used to enclose nuclear reactors as a safety measure. Cold War foreign policy, especially U.S.-sponsored proxy wars, was driven by the idea of the containment of communism to the countries that had already adopted it.

Contamination: To soil, stain, corrupt, infect, or make impure or unclean by contact, exposure, or admixture. The introduction or presence of a harmful substance, such as the contamination of food or medicine by toxins or bacteria.

Contingency: Something incidental to or dependent upon something else. An event or situation that may or could occur, but that is not likely or intended. Having an outcome that is neither impossible nor inevitable, a contingency plan is a plan for the response to an outcome that is possible but not expected.

Continuity: The state or quality of being continuous. Uninterrupted operations; for a business, continuity of operations means ability of the business to continue operating with minimal interruption or alteration regardless of circumstances.

Continuity management: Having the ability or a plan to continue to manage uninterrupted to some degree and/or to be able to continue the flow of a management system with some amount of capable management personnel in place. Business continuity management (BCM) is used to describe or realize components or necessities that are key elements for a continued management and operation, as an integrated and enterprise-wide process.

Continuity of government: The state or quality of being continuous, as in a government remaining stable and reasonably functional without regard to any influences or circumstances (e.g., elections or disasters). The continued performance of essential government functions. Continuity of government plans became especially important in the Cold War under the threat of nuclear war, but it originated with the British government during the bombing attacks of the Battle of Britain.

Cosmology episode: An event that challenges people's assumptions and causes them to question their own capacity to act. An entirely new situation or circumstance wherein one is left without foundation, or with any comprehension or understanding, any applicable prior experience, or any relevant data that might be applied or relied upon.

Creep: An almost imperceptible alteration or change or a gradual shift in direction. For instance, "scope creep" jeopardizes success as the scope of a project gradually increases beyond what was planned. "Feature creep," typically used to describe the addition of features to software, can also describe the negative impact of a project's parameters being extensively tinkered with, especially if the desire of each person involved to add a feature for which he or she can be credited leads to an overabundance of unnecessary tweaks. In emergency management, "instruction creep" is a pitfall to be avoided, because adding more and more phraseology to emergency instructions in an attempt to clarify can actually lead to ambiguity.

Crisis communication: The communication of information related to a crisis instance. Having the communication ability in place required to manage and coordinate the most appropriate response to a crisis and having moment-by-moment information from field personnel communicated to management or operations personnel for more effective and coordinated action.

Criticality: The state of being critical, consisting of or involving criticism. Relating to the judgment of critics, or being a turning point or an important juncture. A point at which some quality, property, or phenomenon will suffer a definite change. Can refer to a state of urgency or a condition involving the danger of death, such as reaching sufficient size to sustain a nuclear chain reaction.

Criticality assessment: An appraisal based on careful analytical evaluation, studied assessment as to what is most critically important—assets or other items or necessities—to the particular purpose or circumstance. An examination of an event to determine its urgency.

Crown fire: A wildfire affecting the crowns of trees. A forest fire that advances first by jumping from treetop to treetop, or jumping from crown to crown, with great speed, ahead of a ground fire. A dependent crown fire is propagated through the undergrowth, while a running crown fire is propagated through the crowns.

Cyber crime: Crime committed with and/or targeting a computer, especially a networked computer. Although popularly associated with theft, robbery, fraud, pornography, and piracy, cybe crime is increasingly relevant in drug trafficking, terrorism, and cyber warfare. The anonymity of the Internet and the physical distance it places between criminal and victim has made it attractive not just for the stereotypical basement hacker but also for organized crime groups such as the Russian mafia, alleged to be responsible for widespread financial, credit, and identity data theft. The increasing relevance of the Internet to the economy and to bureaucracies has also led to a greater danger of distributed denial-of-service attacks. Can involve a shutdown of the general public's access to a Web site resulting from a created overdemand for access.

Cyber warfare: Cyber warfare is typically defined as hacking motivated by politics, though this definition intersects, perhaps misleadingly, with cybe crime as an act of terrorism and with hacktivism. Cyber warfare is perhaps best understood as a hostile action undertaken by a state or its direct agents upon or against another state or other entity.

Cyclone: A system of spiraling winds, which includes hurricanes, typhoons, and tropical storms (all of which are tropical cyclones), polar cyclones, and other storms.

Data recovery: The reconstruction of lost or damaged data, especially electronic data. It is a common misconception that computer data or information is lost or erased. In general, computers do not function in this manner. Software can be used to find "lost data" or, more precisely, to find the starting point of those data. Damage to data is a different case: If data are damaged, software can attempt to logically fill in gaps caused by the damage, and thereby "restore" the data.

***De novo*:** A Latin expression meaning "from the beginning."

Debriefing: A method of gathering information about an event through interviewing the participants in that event; sometimes, as in the military, accompanied by instruction (such as which parts of the information are restricted).

Decision support tools: Tools used to support, inform, or guide the decision-making process, which may be as simple as a list of priorities or decision-guiding maxims, or as complicated as a software package. Similarly, the underlying process may range from an attempt to quantify outcomes and risks to a softer "creativity-unlocking" approach that guides decision makers to a decision that comforts or energizes them.

Defusing: Literally, the removal of a fuse from an explosive device, and by extension the process of rendering safe an explosive device; figuratively, the process of creating safety in a volatile scenario. To relieve the pressure or intensity of a situation or circumstance as if to disarm it.

Department of Homeland Security: A cabinet-level department in the U.S. federal government, created during the year following the September 11, 2001, terrorist attacks in order to create a unified department charged with national security in the civilian sphere.

Destabilize: The process of removing stability from a system; an area may be politically and socially destabilized as the result of physical crisis.

Disaster management: Also known as emergency management. The interdisciplinary field of overseeing, organizing, and formulating strategy for the entities that respond to disasters.

Disaster recovery testing: The process of testing and otherwise evaluating a business or other organization's plan for business continuity in the event of a disaster.

DoS and DDoS: A denial-of-service (DoS) attack is made against a computer, network, or other network resource in an attempt to make it unavailable for its intended use. Distributed denial-of-service (DDoS) attacks use multiple systems to overcome the bandwidth of the target, overwhelming it; DDoSes are difficult to protect against and can be accomplished using cheap computers and a fairly low skill level. Simply put, a network or a Web site server can only accommodate a maximum of visitors. When you view a Web site hosted by a server, your computer is said to be "requesting service" from that server. The server responds to each separate "requesting" computer doing what each one needs, or "service" the computer. A DoS response occurs when the computer server software is overwhelmed by too many service requests.

Drift: To be carried along with the prevailing currents of air or water, not necessarily on course. To slowly deviate or to be directionless.

Drill: An exercise performed to test a planned response to a circumstance, such as a fire drill. To practice or to repeatedly rehearse a method or procedure. To fix something in the mind or in habit by a pattern of repetitive instruction or action. Alternately, "drill" can refer to the action of bearing down with great pressure or weight on a shaft-like tool, especially one that is rotating and having two or more cutting edges for the purpose of making holes in a firm material, like wood, metal, concrete, or the Earth.

Drought: A lack of rain and thus a lack of water. An extended period of precipitation being significantly below average. A region can experience drought even during or shortly after a rainfall: many systems impacted by drought (including human water supply, river ecosystems, and most plant life native to nonarid regions) require periodic precipitation and cannot easily adapt when that period is interrupted or delayed. Extended drought damages an ecosystem's ability to make use of what rain does fall. Dried-out soil develops a layer of dust that rainfall is more likely to run off without being absorbed.

Drug resistance: The reduced effectiveness of a drug that is intended to kill a pathogen. The development of antibiotic resistance in harmful bacteria is a serious cause of concern within public health. Pathogens that develop resistance to multiple drugs are called multidrug-resistant; methicillin-resistant *Staphyloccoccus aureus* (MRSA), for instance, is a strain of staph infection of serious concern to hospital patients and health care workers, athletes, and prison inmates, all of whom encounter it frequently.

Early warning system: A system, technological or social, intended to provide warnings in advance of various types of possible crises. These range from those concerning possible natural disasters to those that are on watch for nuclear missiles. Any system developed for the purpose of any kind of advance warning.

Electronic vaulting: The storage of data in an offsite facility that is frequently backed up for protection, particularly if the actual site is fireproof, secured under lock and key, or bomb and/or radiation proof.

Emergency alert system or emergency broadcast system: The Emergency Alert System replaced the Emergency Broadcast System in 1997. Both are systems established to provide a method for the American government to communicate emergency information to the public through radio and television. Never used for a national emergency, it is frequently used to communicate information about local and regional emergencies.

Emergency medicine: The treatment of health conditions requiring immediate attention, as a medical specialty; and the provision of services for that treatment, as in a hospital's emergency room, or on-site at disasters.

Emergency operations center: A central command center for carrying out emergency management functions. An emergency situation headquarters.

Emergency powers: Special powers granted to the government or an office or department thereof, under special periods of emergency; such powers may relate principally to expenditures, as when local and state governments are empowered in a state of emergency to spend money not previously budgeted in order to respond to the emergency, or may include the suspension of normal limitations on actions, as when habeas corpus was suspended by the federal government during the Civil War. (This would refer to the power to impose martial law and to disband any constitutional government.)

EMS: Emergency medical services; the provision of out-of-hospital (including pre-hospital) medical care for acute conditions. EMS includes ambulances and other services. In the United States, an ambulance typically focuses on stabilizing the patient on-site and providing pre-hospital care while en route to a hospital; in other countries, ambulances may provide the bulk of emergency medicine.

Enactment: The action of making something into an act or a statute, as in a law. The action of representing or performing something in, or as if in a play: to act out. The idea, introduced by organizational theorist Karl Weick, that a phenomenon is created by being talked about—organizations, their norms, procedures, and rules, for instance, are brought into being through verbalization by management.

Endemic: More normal or natural to a locality or a specific regional group of people. From the Greek word *en*, meaning in or within, and the Greek word *demos*, meaning people, or in the case of a crisis, referring to a population. In medical usage, a specific disease may be normal in one population within one climate or region and abnormal in a population within another climate or region. Unique to a specific ecological region; a pathogen endemic to a region may not respond to vaccines or treatments designed for pathogens from other regions.

Epidemic: Any disease that is spreading throughout a population to a major degree. An occurrence of disease in a population beyond a certain threshold. An epidemic that spreads to many people in multiple countries or continents is considered or referred to as a pandemic.

Ethnic cleansing: The killing or driving away of populations of people based on ethnicity or religious affiliation, when carried out as a matter of policy by another people, population, or government.

Experiential learning: The process of gaining understanding and building knowledge from experience.

Extinction event: A sharp decrease in the diversity of species as many die at once, especially with the implication that there is a shared cause in these extinctions. The classic example to cite is the extinction of dinosaurs, though this may have involved multiple extinction events and included the extinction of many non-dinosaur species.

FAA: The Federal Aviation Administration, the American government agency with jurisdiction over civilian aviation.

FAO: The Food and Agriculture Organization of the United Nations, an agency leading efforts against hunger and malnutrition.

FEMA: The Federal Emergency Management Agency, the principal federal agency responding to emergencies, now under the Department of Homeland Security.

Fight or flight response: An aspect of the system of stress responses among many animals, in which threats are responded to with biological processes that prepare the animal to either fight or flee. First described by physiologist Walter Bradford Cannon and later confirmed by numerous studies of organisms including humans and most vertebrates and the specific physiological phenomena observed (such as an accelerated heart rate).

Flood: The overflow of water (whether from a body of water or as a result of precipitation) onto land, typically excluding tidal action except when it is unusually high.

Food desert: An area in the developed world where it is difficult to obtain food that is healthy and affordable, such as urban areas where fast food and convenience stores are the norm and fresh produce and healthy proteins are difficult to find. Food deserts are of increasing concern in addressing the obesity epidemic and other public health concerns, as well as in the context of food and agricultural policy and the intergenerational effects of poverty.

Food security: The availability of nutritious food to a population and one's access to it. Food security is regularly jeopardized by natural disasters, armed conflict, political unrest, poverty, and crop failures. The 2010 Food and Agriculture Organization of the United Nations study shows that more than one-quarter of the world lacks food security at some point during the year. Jeopardy to food security is both an effect of some crises and a contributing cause to others.

Ground fire: The combustion of roots and undergrowth without flames. In forestry, a forest fire that burns the humus and may not be visible on the surface. Peat and decayed leaves may burn deep below the ground surface and may smolder invisibly for days.

Groupthink: An overprioritization of harmony and sameness among members of a decision-making group that leads to expending most of the group's energy on finding a consensus rather than finding the best solution. In management, a group that is by nature in complete agreement with its leader as the norm. This operational mode is cited as overriding better alternatives, moral judgment, efficiency, and reality testing.

H1N1: H1N1 is a type of influenza virus that includes what is popularly known as swine flu. Notably, there was an epidemic in 2009. It is a human respiratory infection caused by the influenza virus H1N1.

H5N1: A subtype of the influenza A virus that includes the "bird flu." Bird flu was a pandemic.

Hacktivism: The use of hacking, or breaking into computer systems. This is generally done illegally and sometimes for political purposes or to pursue political ends.

Hard power: The use of some sort of force. The use of coercion, whether military, economic, or other, to obtain political power and influence, generally between nation states. States have historically relied on hard power more often than alternatives.

Hazardous materials: Substances harmful to people, other organisms, or the environment; often abbreviated as "hazmat."

Hazardous waste: Hazardous materials produced as the waste by-product of a process or industry.

Hijacking: The illegal seizure, usually by force, of a vehicle.

Hostage: A kidnapped person who is held captive for money, especially for the purposes of being used as leverage to force the actions of a third party, whereupon that the hostage might be released by the captors.

Hot site: A backup site consisting of a complete duplication of the organization's worksite, including data backups (ideally synchronized with the original site) and all the equipment necessary for business continuity.

Hurricane: A tropical cyclone consisting of a low-pressure center, strong winds, and heavy rain. To qualify as a hurricane, winds must be equal to or exceeding 74 miles per hour or 64 knots. The name *hurricane* is used in the Caribbean Sea, Gulf of Mexico, Atlantic Ocean, and western Pacific Ocean. Eastern Pacific Ocean storms of this magnitude and storms elsewhere are referred to as typhoons.

Hyogo Framework for Action: A list of action priorities produced by the 2005 World Conference on Disaster Reduction, held by the United Nations in Kobe, Hyogo, Japan. The Hyogo Framework for Action is a 10-year action plan to make the world safer from natural hazards.

Improvised explosive device: A homemade bomb, also referred to as an IED. Improvised explosive devices are generally constructed as either anti-personnel or anti-vehicular and are most commonly used in the form of a land mine. Rather that having a triggering device, these are commonly set off by a human using remote wires or controls.

Incident Command System: A system and structure designed to improve emergency response operations in multiple types of circumstances and complexities; it coordinates and integrates personnel, policies, procedures, facilities, and equipment. The system used by the Federal Highway Administration to coordinate emergency response, FEMA, and other national agencies, as well as most states and some major cities.

Information assurance: The protection and defense of information to ensure its availability, integrity, authenticity, and privacy, including backups, encryption, and protection from alteration, theft, or hacking. "Assurance" is the confidence one can have in the validity of the information being protected or relied upon, as defined by the National Security Agency.

Infrastructure: The physical and organizational structures necessarily for the basic operations of a community or business, such as the roads, waterways, and structures necessary to provide water, electricity, and telecommunications.

Interdependence: A relationship of mutual dependence among elements. Reliance in a mutual fashion or a cooperative manner for functionality.

Interoperability: The ability of organizations to work together, or to interoperate. Interoperability is key to ensuring rapid response to crisis and minimizing friction from a clash of different operational approaches.

Interstate war: A war waged between two countries, often with the aim of one of them gaining control over some or all of the other's territory. In the 21st century, interstate war has become a rarity, and intrastate wars (civil wars and revolts) have become more common.

Invasive species: A non-native species that, once introduced to a region, disrupts it by threatening biodiversity. The new species may become the dominant species, and some native species may diminish. The dangers invasive species represent to the health of an existing ecosystem—and the economic, cultural, and public health institutions dependent on that ecosystem—are one of the reasons for the controls placed on the import and export of living organisms (the other is the possible spread of pathogens present on or in that organism).

Kidnap insurance: Kidnap insurance reimburses for the cost of ransom in the event of a kidnapping.

Loose coupling: A term originally conceived in computing and systems design. Coupling refers to how much or how little knowledge, information, or data that a functionality can use or receive from another functionality. A loosely coupled system is one in which each of its components has, or makes use of, little or no knowledge of the definitions of other separate components. The term can also be applied to intelligence agencies, police agencies, or other organizations.

Martial law: The rule of an area by the military, sometimes for the stated purpose of dealing with an emergency situation. The suspension of civil rule of law and the imposition of absolute rule. The posit is that normal civil institutions are disrupted and perhaps incapable of dealing with the circumstances or responding quickly and efficiently.

Maslow's hierarchy of needs: Abraham Maslow proposed in 1942 that humans are driven by the pursuit of needs he placed in a hierarchy and categorized as physiological, safety, belongingness and love, esteem, and self-actualization.

Mitigation: To moderate something, like a circumstance, condition, or quality, in some aspect such as force or intensity, or to alleviate or make milder in some way. The reduction of harmful effects. Risk mitigation and hazard mitigation are strategies intended for reducing the risk an endeavor incurs or of reducing the damage of a hazard encountered.

Mobilization: Put into movement or circulation, or the action of assembling and putting into readiness for war or some other emergency. The process of assembling and putting in motion, such as the mobilization of a team of emergency response personnel.

Moral hazard: The idea that if a decision maker is protected from the effects of risk by a third party, the decision-making will be affected. For instance, a driver who is insured against the cost of an accident is in a position of moral hazard in which he or she may be less motivated to drive carefully. Moral hazard can arise when an individual or institution does not have to take the full consequences and responsibilities of its actions, and therefore has a tendency to act less carefully and with greater risk than it normally would, possibly leaving another party to hold some responsibility for the consequences of those actions.

Mutual aid: A promise, agreement, or contract to aid one another. This can be between persons, groups, cities, or nations. In emergency services, mutual aid is the agreement between such services to assist each other regardless of jurisdiction; such agreements are a practical necessity because of the possibility of a disaster that may exceed the jurisdiction's resources. Fire departments often have formal agreements in place to lend assistance automatically, in order to contain a fire emergency as quickly as possible.

Natural reservoir: The natural reservoir is an organism that can be a host for a pathogen of an infectious disease, typically an organism that is asymptomatic. For instance, cats are the natural reservoir of "cat scratch fever," the Bartonella bacterium that does not affect cats but can infect humans scratched or bitten by them.

Near-line: The term *near-line* is a foreshortening of the term *near-online*. It is used in reference to computer data storage and retrieval and the access speed thereof. The term *near-online* would refer to a method that is nearly as fast as online, meaning not as fast or slower than. Online would mean wired directly to the computer, for instance, having an external hard drive connected. Near-line storage of data is not online storage, which is accessed near-instantly, but is not as slow as off-line storage in backups or long-term storage media. Near-line storage systems vary but typically involve types of storage media that can be placed into a drive to facilitate requested data access.

Nongovernmental organization: Though most organizations are nongovernmental organizations, the term coined by the United Nations is specifically used for organizations that operate independently of any government, but that are not part of the for-profit private sector.

Non-state actors: Non-state actors refers to any group or entity that is not a nation-state. Although the term is typically used to describe groups such as Al Qaeda, other terrorist groups, or international drug cartels such as those in Colombia or Mexico, the same term is technically applied to multinational corporations, nongovernmental organizations, and international media groups, among others.

Nuclear football: A briefcase containing the nuclear launch codes needed by the president of the United States to authorize a nuclear attack, as well as other critical information.

Nuclear proliferation: The spread of nuclear weapons and weapons-applicable nuclear technology, whether the physical elements themselves or key information pertaining to their construction.

Outbreak: An occurrence of disease in excess of the expected norm. Although it is expected that a number of people will have the flu at any given time, a massive increase in flu in a given area would be an outbreak.

Panic: Fear strong enough to interfere with rational thought, moral reasoning, and decision making. Fear itself is not panic; panic is characterized by the effect it has on decision making and acting. Predetermining responses to crises is one way to mitigate the effect of panic on decisions.

Post-traumatic stress disorder: Post-traumatic stress disorder (PTSD) is an anxiety disorder that develops after psychological trauma. First identified in soldiers and originally conflated with combat stress reaction (also known as shellshock in World War I, or soldier's heart in the Civil War), which is notably different in that it is acute, whereas PTSD is chronic.

Preparedness: Readiness; the state of being ready to respond to events.

Prodrome: An early symptom that might signal the imminent onset of a disease. Early intervention may mitigate the severity of the disease.

Public health: The health of the community at large. Public health professionals are especially concerned with promoting practices that limit the spread of disease or mitigate the risk of injury, as well as with environmental health, nutrition, and public safety.

Quarantine: The isolation of an infected population in order to prevent the spread of infection.

Reputational risk: The risk of loss of reputation by a business. The trustworthiness or public image of a business.

Resilience: The capacity to respond quickly to changes in circumstances or to resist damage caused by such changes. The ability to recover quickly from illness, change, or misfortune.

Risk aversion: To choose a course that will most likely avoid loss. A tendency to avoid risk when there is a low-risk, low-reward alternative available. Risk aversion is relevant in everything from economics to interpersonal relationships.

Risk communication: The improvement of decision making by making comprehensible the risks related to the decision. In public health, risk communication is an interactive process of exchange of information and opinion among groups for the discussion of risk types and levels and concerning methods for managing risks.

Robustness: Hardiness, being strong and healthy in constitution. The quality, in a decision or plan, of having eliminated all possible uncertainty and representing an approach with a well-understood level of risk and reward.

Routine emergency: An incident threatening life, health, property, or the environment, and requiring a fast response to prevent further damage, but that is sufficiently within the realm of normal activity that it is a scenario or variation on a scenario for which the relevant personnel have planned and prepared. A crisis, in contrast, is non-routine and unpredictable in its occurrence, scale, or complexity, and the threat it poses may have vast, long-term effects.

Sabotage: Intentional subversive damage caused to a building or machine. The deliberate destruction of, or interference with, a process, structure, or other entity for political ends.

Sensemaking: The process of assigning meaning to experience.

Social distance: The figurative distance between social groups, affecting their ability to work together.

Soft power: A strategy for obtaining power and influence by co-opting entities rather than coercing them. Economic agreements, civic action, and foreign assistance are among a nation's soft power tools, or a persuasive approach to international relations.

Spot fire: A localized, concentrated wildfire, a spot fire is one or more small fires started by flying sparks or embers at a distance from a main fire.

Succession plan: A plan for filling leadership roles as they are vacated; originally, this referred to heads of state and government, but succession plans are expected in businesses, and large organizations are expected to prepare internal players for the possibility of filling a leadership role.

Surface fire: Wildfire occurring in rangelands, bushes, and plant litter.

Swiss cheese model: In the fields of risk analysis and risk management, the Swiss cheese model of accident causation is used to find and assess "holes" in a system. A model of accident causation popularized in the health care, emergency service, and aviation industries, in which systems are considered like slices of Swiss cheese stacked together, each hole represents a weakness, and when holes in different slices align, the opportunity for disaster is created.

SWOT analysis: SWOT is an acronym for strengths, weaknesses, opportunities, and threats. A strategic planning technique developed in the 1960s by Albert Humphrey. The analysis evaluates a project's strengths, weaknesses, opportunities, and threats.

Systems accident: The crisis that emerges when multiple failures in a system interact in an unexpected way.

Systems approach: An approach that considers the way the parts and processes of a whole influence one another and thus the entire system. In management, a systems approach emphasizes the interdependence and interactive nature of elements both within and external to an organization. Systems thinking is the process of understanding how things influence one another within a whole.

Terrorism: The use of fear, violence, and threats to intimidate or coerce, especially for political purposes. The term *terrorism* first came into usage during the French Revolution to describe a period that became known as the Reign of Terror. Terrorism generally refers to acts and actions committed by nongovernment groups as opposed to acts of war that are committed by nation-states.

Triage: Resource allocation based on severity of need. Various models of triage are used in emergency medical services, but the term is used metaphorically in many crisis management situations.

Virus: A virus may be either an infectious biological agent that replicates inside the living cells of an organism and can cause disease or, figuratively named for the former, a computer program that is sent to infect a computer or a computer system, which then replicates itself and sends itself out to other computers and computer systems, usually with the goal of doing damage. This generally involves an executable file that a human must start or run and is not automatic. A virus program functions and propagates by inserting a copy of itself into another program and becoming part of that program.

Worm: Self-replicating malicious software, often delivered through a computer network. A worm may travel unassisted to other computers and networks by making use of file-transport or information-transport features within a computer or computer system. Worms often exploit a vulnerability on the target system that allows them to execute themselves and operate. Worms are stand-alone programs and do not require a host program or human help to propagate.

Resource Guide

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